THE AMERICAN
JOURNAL OF PSYCHOLOGY
Founded by G. STANLEY HALL in 1887

VOL. XX APRIL, 1909 No. 2

CONTRIBUTIONS TO THE STUDY OF THE AFFECTIVE PROCESSES[1]

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The writer's interest in the psychology of the affective processes dates from the year 1896, when he read Wundt's *Grundriss der Psychologie*, and in conjunction with Professor Motora began a translation of that work into the Japanese language. Hence, when opportunity arrived for the undertaking of advanced work, in the laboratories of Harvard and Cornell Universities, he naturally chose the feelings as a subject of special research. The experimental results obtained in the Harvard laboratory, under the direction of Professor Münsterberg, will be published in another place. The present paper gives the results of three investigations pursued in the Cornell laboratory during the years 1907-1909.

It is to be said at the outset that these investigations have not been made upon any systematic plan. In the present state of affective psychology, no such plan is possible, save to those who adopt the attitude and theories of a particular school. The writer entered upon them with an open mind, and believes that he has impartially recorded their outcome. He has simply sought to experiment at points where experimentation appeared feasible and desirable. So far as space allowed, he has given the observers' judgments and reports in their own words. Nevertheless it may quite well be the case that his interpretation and conclusions seem to the reader to lay undue

[1] From the Psychological Laboratory of Cornell University.

emphasis here and to show undue neglect there. The handling of a large body of introspective material, obtained in experiments that continued for several months, is at best a difficult task; and there is something misleading in the printed account, even if it is objectively correct, since all the sentences stand out at the same level, without the shading and subordination that appear in the spoken reports. Hence the writer desires to say here, at the very beginning, that no interpretation or conclusion is offered in the following pages that is not acceptable to the observers themselves. Wherever there was doubt as to the meaning of a report, the observer was consulted, and was asked to supplement or explain.

The paper falls into four parts: I. a study of the mechanism of the affective judgment; II. a study of the *Reizmethode;* III. an account of incidental results, bearing upon current affective problems, which were obtained in the course of the preceding studies; and IV. a study of affective process by the method of the discriminative reaction.

I. The Affective Judgment

When an observer, in work done by means of some one of the regular metric methods of psychophysics, makes a record of 'like' or 'different', 'present' or 'absent', we say that he has passed a sensory judgment. When the observer makes this record in work upon the affective processes, we say that he has passed an affective judgment. The phrases are parallel, and suggest an identity, or at any rate a similarity, of mental mechanism. Nevertheless, our knowledge of the two sorts of judgment is very different. Stumpf, for instance, bases his whole psychophysical theory upon the fact of the universality of the sensory judgment, and defines psychophysics itself as the concluding chapter of a "quantitative science of judgment".[1] Whether or not we accept this view, we cannot doubt that the position is tenable and arguable; enough is known of the sensory judgment to make its facts available for theory. On the other hand, our knowledge of the affective judgment is practically *nil.* Scattered hints towards its psychology may be found in the various investigations carried out by the method of impression. But no one appears to have asked, or to have sought experimentally to answer, the question: What precisely goes on in consciousness when I judge 'pleasant', 'indifferent', 'unpleasant', or 'more (less) pleasant', 'more (less) unpleasant'?

There are, of course, many cases in which this question is rendered nugatory by the writer's general conception of affective process. If affective tone or algedonic tone is merely an

[1] C. Stumpf: *Tonpsychologie*, i, 1883, §§ 1-7; Titchener, *Exper. Psychol.*, II, ii, 1905, clxi ff.

attribute of sensation, co-ordinate with intensity and quality, then the affective judgment is a sensory judgment akin to that of 'louder' or 'fainter', 'blue' or 'red'. If affection is itself sensation, organic sensation or centrally excited concomitant sensation, then again the affective judgment is a sensory judgment, akin to judgments of kinæsthesis or of synæsthesis. The former hypothesis, however, may be summarily dismissed; it cannot be seriously maintained, in the present state of psychology, that feeling is an attribute of sensation. The latter hypothesis is now on trial, in various forms, and has been accepted by many psychologists of standing. But there are at least as many, of equal standing, who assert the independence of affection as an elementary mental process. We cannot, therefore, assume without examination that a study of the affective judgment is superfluous, or identify that judgment outright with sensory judgment.

Experiments with Tones

Of the three principal forms of the method of impression, the serial method, the method of single stimulus, and the method of paired comparisons, the last was chosen in the present experiment as the method of procedure. As regards the selection and duration of stimuli, the interval between observations, and general experimental conditions, Titchener's method in his harmonical experiment was repeated as closely as possible, except in a few points where differences were necessitated by the divergent aim of the present investigation. The reasons for repeating these experimental conditions are as follow. Titchener's article in the Wundt *Festschrift*[1] contains definite indications as to the nature of the affective judgment, and Hayes' study[2] by the same method strongly confirms Titchener's conclusions. But these indications were brought out by way of evidence for the dual theory, as against Wundt's tridimensional theory, of affective process. Hence, although the two papers in question contain many suggestions with regard to the nature of affective judgment, and although the conclusions are based upon careful introspective records, yet the results are in so far indirect as that they were obtained incidentally, in the course of work upon a wider problem, the problem of the number of elementary affective qualities. On this account it is important to repeat Titchener's and Hayes' experiments, and to confirm or to refute their conclusions.

Another and, from the standpoint of systematic psychology,

[1]Titchener: *Ein Versuch, die Methode der paarweisen Vergleichung auf die verschiedenen Gefühlsrichtungen anzuwenden*, Philos. Studien, XX, 1902, 382 ff.

[2]Hayes: *A Study of the Affective Qualities, Amer. Journ. Psychol.*, XVII, 1906, 358 ff.

a still more important reason for the repetition of these experiments lies in the fact that the nature of their 'subjective evidence' suggests the existence of simple, elementary affective processes, and tells against the view that makes feeling a resultant or mediated experience. Again, however, the introspective indications do not demonstrate the independent existence of an affective element, nor did the authors directly approach this problem.

There can, then, be no doubt that we have here a definite point of departure for a further experimental study of the affective problem. It remains to decide how, in detail, the method of paired comparisons shall be applied.

Titchener applied his method to two of the three Wundtian dimensions; while Hayes, for sufficient reasons, extended it, and attempted to take into account, for one and the same set of stimuli, all three of the affective dimensions. In the present study, the observers were required to pass judgment only in terms of pleasantness and unpleasantness (P-U), except when the affective reaction was 'doubtful'. This limitation is justified by the considerations: (1) that while no one denies the validity of P-U as an affective dimension,[1] all other dimen-

[1] In the *Journal of Philos. Psychol. and Sci. Meth.*, iv, 1907, 190, C. H. Johnston remarks that "it is not quite accurate to say that 'no one denies the validity of P-U as a feeling dimension'". He cites the work of C. Minnemann, Atmung und Puls bei aktuellen Affekten (Martius' *Beiträge*, i, 4, 1905, 514 ff.), asserting that the author "is inclined to give up the P-U hypothesis as not serviceable, in that there are found for them [*i. e.*, for P and U] no distinguishing characteristic physiological symptoms". The reader will not find this statement in Minnemann. This writer is discussing emotions, not simple feelings; and he is examining them in the light of their expression in pulse and breathing. What he says is that, if you set to work to classify emotions in the light of physiological *Affektbilder*, you will not get much beyond the old division into sthenic and asthenic states. Johnston is probably quoting a remark made, not by Minnemann, but by Martius (*ibid.*, 512), to the effect that "festzustehen scheint auch, dass Lust und Unlust in keiner Weise bestimmte Symptomenkomplexe besitzen, durch welche sie sich voneinander unterscheiden". But this fact, if fact it be, has nothing to do with the validity of P-U as an affective dimension. Johnston further says that "Royce . . . finds many affective states which do not exhibit the P-U dimension". So he does, and so does Wundt; but neither denies the existence of the P-U feelings; see Royce, *Outlines of Psychol.*, 1903, 178. To maintain that P-U is an affective dimension is not to maintain that all affections are necessarily comprised within that dimension; and, similarly, to maintain that some feelings are feelings neither of P nor of U is not to maintain that P and U are not feelings. "It will be recalled further," says Johnston, "that for Binet also the fundamental feeling opposition is not of the P-U type, but rather of the nature of an activity-repose dimension." If the reference is to the work of Binet and Courtier, in *Année psychol.*, iii, 1897, 65 ff., it is no more relevant than that to Minnemann. The *Affektbilder* are, again, dependent rather on the intensity than on the quality of the emotion; but the writers speak, without hesitation, of emotions and ideas that

sions are matters of dispute, and (2) that our immediate problem is not that of the number of the affective qualities, but that of the determination of the nature of the affective judgment.

The method employed, therefore, is the same as that described by Titchener and Hayes, save for the limitation just stated, and for one important and a few minor differences, to be mentioned below. The same harmonical and noiseless pendulum, marking seconds, were used. The 24 tones in the three octaves *C-c* (64-128vs.), c^1-c^2 (256-512vs.), c^3-c^4 (1,024-2,048vs.) were combined in all possible ways, thus giving a series of 276 pairs of tones. The series was first formed by chance, and then so rearranged that the same tone should never occur in two successive pairs. Which tone of a pair should be given first was also determined by chance. In the earlier studies, this series was given 12 times to each observer; 6 times upward (lower tone first), and 6 times downward (upper tone first); so that there was a total of 3,312 experiments for each observer, exclusive of 'Make-up' experiments. In the present experiment, the series was not repeated, and only the total number of 276 pairs of tones was given to each observer. Number of experiments was here less important than full and accurate observation, since we were to make no appeal to the 'curves' which present in quantitative form the course of the affective judgment, but had introspective analysis as our primary object. The whole series of 276 pairs was given in precisely the same order to both observers. In most experiments, the two observed together sitting with their backs to the harmonical, about 2 meters from it, with a screen between them. The experiments were made at weekly intervals during the months of November, December, 1907, and January, 1908;[1] the hour, 2-3 P. M., was kept constant. The observers were instructed to judge of the relative pleasantness of the tones in the pairs sounded. They were told to listen to each tone separately, and to analyze their judgments introspectively, as fully and accurately as possible; especially they were to note the basis, motives, cues, in short, the means by which these judgments were or seemed to be effected. After ten pairs of tones had been presented, the observers began to write down their introspections; no limit of time was set, but in general a period of ten to fifteen minutes was found sufficient. The experimenter had intended to allow five minutes for rest as near the middle of the hour as the work permitted, but the observers

are 'gaies' and 'tristes'. Finally, Johnston refers to Mach; but see *Analyse der Empfindungen*, 1900, 14!

[1] The interval of a full week was chosen with a view to the avoidance of any possible habituation, of which, we may here say, there was not the slightest trace throughout the experiments.

declared that this interruption was unnecessary, and for the most part continued throughout the hour without any relaxation.

The actual procedure of an experiment is as follows. The experimenter stands before the harmonical with one foot upon the raised pedal, the paper containing the series of the tones in his left hand, the pendulum bob in his right. At the signal "ready," he releases the bob and presses down the first note to be sounded. After two full swings of the bob (2 seconds), he treads once quickly and once slowly upon the pedal, and keeps a strong, even tone sounding for two swings of the bob. Then, after two seconds of silence, the second tone is sounded for two seconds in the same way. An interval of from 2 to 6 seconds is allowed, between the pairs of tones, for the recording of the judgment. After the 141st pair, this interval was increased to 30 sec., to allow of the writing of short notes upon important points of observation, and to prevent a possible lapse of memory during the remainder of the ten comparisons. This arrangement was continued until the 171st pair, when the observers decided that the interval was unnecessarily long, and the time was accordingly reduced to 15 seconds for the rest of the series.

The occasional unevenness in the intensity of the tones, the noises from the mechanism of the organ, the occasional creaks of the pedal in certain kinds of weather, noises within and without the building, the peculiar character of a few tones (c was apt to sound suddenly and at high intensity; b^3 and c^4 were rather faint; c^3 now and again developed a tremolo)—these disturbances and variations in the stimuli were of no material consequences for our problem. Moreover, the high degree of training of the observers showed itself in the rapid development of power of concentration, and in the complete ignoring of the disturbing factors. We were, therefore, not obliged to repeat in 'Make-up' series the occasional tests into which these disturbances and variations entered.

The results of the experiment are embodied in the introspective records of the observers. G's records are presented below in their entirety, so that any possible arbitrariness of quotation and conclusion is out of the question. Insight and accuracy are individually different, and the same materials may admit of different conclusions. But the introspective records here quoted stand for the facts observed, and represent the actual reaction of the observer. Observer G is Mr. L. R. Geissler, assistant in the psychological laboratory. G had had 3 years experience in experimental work, and had already taken part in extended affective studies. He is musical.

Introspective record I. 1st to 10th pair

1 (a^3-c^3) first **Judgment usually very difficult. There was hardly**

2	(c-c^4)	first	any inherent affective tone in the stimulus. Judg-
3	(a^3-a^1)	second	ment was arrived at by reasoning about the differ-
4	(d^3-d^1)	second	ent attributes of the two tones; for instance, the
5	(g^1-D)	second	one tone was smoother, more evenly blown (in-
6	(B-e^3)	first	tensively). The highest tones usually call forth
7	(E-g^1)	second	a frowning and twitching in the eye-lids. I am
8	(C-g^3)	first	afraid I am not yet in the right mood; I am some-
9	(F-g^1)	first	what constrained in my bodily attitude.
10	(e^3-f^3)	second	

In the above record, the figures in the first vertical row indicate the number of the pair sounded for comparison, while the word 'first' or 'second' in the third row indicates the observer's judgment that the first or the second tone of the pair was the more pleasant. In the remaining records, these data are omitted.

Record II. 11th to 20th pair

This series was rather irregular because of disturbances. I never could get into a truly affective mood. My judgments were still made intellectually, by deciding on the different attributes of each tone.

Record III. 21st to 30th pair

Closed my eyes, took the most comfortable bodily position, and let myself go entirely. Kept all foreign ideas out of my mind, and tried to keep myself in a perfectly constant and unchanged mental and bodily attitude. Now whichever of the two tones was more confirming in this, or whichever was less disturbing, was felt as the more pleasant.

Record IV. 31st to 40th pair

Was more difficult than last time to get into an entirely restful, quiet attitude. Consciousness was several times disturbed by external noises and ideas associated with them. Otherwise, I tried to make judgments on the same basis as before. Of my body I seemed to be unconscious altogether. The tone which disturbed me the less by fewer parallel other sensations and associated ideas was called the more pleasant. The tone whose qualities could easily be analyzed or forced themselves singly into focus was unpleasant.

Record V. 41st to 50th pair

In these cases the pleasantness was usually decided on the basis of some quality in the two tones. I was not yet able to get into the right mood. Associations aroused by the tones also sometimes decided the affective judgment. There seems to have been an entire absence of organic sensations, as far as I remember; *i. e.*, the judgment must have been based only on the external stimulus.

Record VI. 51st to 60th pair

I am at a loss to say why I liked the one tone better than the other. I know I am somewhat biased in favor of the lower tones anyhow, but I try to neglect this. My judgments are the conclusions drawn from an intellectual comparison of the different qualities in the two tones, the tone which comes nearer to a pure tone being called more pleasant. But I am unable to discover a purely affective elementary process in my consciousness.

Record VII. 61st to 70th pair

Tried to let tones make their impression without writing down the judgment, but found that I could not get much, because the tones did not have much affective quality in them, and associated ideas tried

to take the place of the affective judgment; only two or three pairs seemed to have something essentially different in the affective coloring of their respective members. But this shows that compulsory affective judgment is artificial.

Record VIII. 71st to 80th pair

Was still trying to quiet down after a fast walk; the lower tones were more quieting and soothing than the higher, and therefore more pleasant. By more quieting I mean that they seem to have a slowing effect upon breathing (and perhaps on pulse as felt in temples).

Record IX. 81st to 90th pair

Much more difficult to judge this time. Decided mainly by the qualities of roughness or smoothness in tones. I am not sure whether the lower tones are not more conducive to my general mood of quiet phlegmaticism. The lower tones do not disturb my organic equilibrium, do not seem to call for any kind of conscious muscular readjustment, while the higher tones do, sometimes very distinctly so.

Record X. 91st to 100th pair

I don't know whether there was anything peculiar in the different octaves. I know the tones made very little impression upon me one way or another; they hardly changed my general mood, and I simply judged them more pleasant by the presence of greater smoothness.

Record XI. 101st to 110th pair

Most notes were hardly pleasant at all, only in so far as my general mood was not disturbed by them. Only the very high tones are less pleasant distinctly, and always cause an involuntary frown. Occasionally I noticed my breathing and thought it rather deeper and longer than commonly.

Record XII. 111th to 120th pair

I was somewhat distracted by various things, and my mood was not very constant. The judgment was made more or less on the basis of secondary qualities in the tones; *i. e.*, they are logical constructions rather than indications of feelings. The whole situation as such was not very pleasant; there was much anxiety about the unsuccessfulness. This anxiety seemed to be an irregular flow of ideas, sometimes smoother and easier than at other times.

Record XIII. 121st to 130th pair

This time the general mood was better, almost indifferent, and the tones that disturbed it less were judged more pleasant. For the first time I noticed a mass of organic sensations trying to claim my attention, especially in the intervals between the pairs. I cannot say whether these organic sensations had anything to do with the general mood or the various feelings in particular; I simply noticed their presence.

Record XIV. 131st to 140th pair

The tones were more indifferent than ever before; even the highest ones no longer cause any great affective disturbance of the general mood. I had to guard myself against perfunctory judgments and asked myself again and again: Which tone do I actually like the better?

Record XV. 141st to 150th pair

My general mood of undisturbed indifference was very little or sometimes not at all changed by the various tones. The judgments were made on an inferential basis. Sometimes a few organic changes were noticed, but they did not seem to influence or be influenced by the general mood or even the tones.

Record XVI. 151st to 160th pair

The long intervals between the pairs (30 sec.) allowed me to fall into a kind of sleepy drowsy mood of a distinctly pleasant character. Now whichever of the two tones disturbed this mood more was judged more unpleasant. Some tones seemed to be surprisingly different either as to loudness or smoothness or both, and thus their affective tone was more easily determined by the greater surprise which they set up and which was unpleasant. Also the momentary awakening and writing down of the judgments was more or less unpleasant.

Record XVII. 161st to 170th pair

The situation was very similar to the one before. I find my previous observations confirmed, and merely tried to rule out the element of surprise as far as possible. I noticed also that the more unpleasant tones sometimes evoke a tendency to some facial muscular reactions, but only once did I feel an actual frowning, perhaps because my attention was not especially concentrated on this element.

Record XVIII. 171st to 180th pair

The only way I seem to be able to judge real pleasantness and unpleasantness is to let myself go entirely, to become passive, and to remain in a very constant, even half-sleepy mood and observe which of the two tones arouses me more or less to a normal state and which leaves me in the same mood as before. The tone which leaves me in the drowsy mood or disturbs me less in it, is the more pleasant. The tone which brings me back to a more normal mood of everyday life is more unpleasant.

Record XIX. 181st to 190th pair

Somewhat similar to last series, although the mood was not so phlegmatic and drowsy. I cannot remember that any organic sensations disturbed me or came into notice at all. The general feeling of indifference seems indescribable. The judgments arouse sometimes ideational associations, but these come rather after the figure [indicating judgment] is written down. Sometimes also, after the writing, I catch myself reflecting on other qualities of the tones compared.

Record XX. 191st to 200th pair

This time my attention seemed more labile; several times I found myself thinking of other topics. Hence the tonal judgments were made entirely on the affective basis. Only once I was doubtful, and began to reflect on the other qualities of the two tones compared. Toward the last the question occurred to me: Which of the two tones would disturb me less, or to which of them could I adapt myself more perfectly and more easily? The answer coincided with the more pleasant tone.

Record XXI. 201st to 210th pair

It seemed much easier to make the judgments, except in the doubtful cases. My attention was more concentrated than before, and ideational associations were easily kept out. My general mood was an easy let-go feeling; no organic or other sensations disturbed me.

Record XXII. 211th to 220th pair

Was less restful than before, also disturbed by wandering attention. But most of the judgments were easily made; perhaps because there was a great difference in pitch between the tones in the pairs.

Record XXIII. 221st to 230th pair

I have not yet got into a really comfortable mood of indifference,

and it was harder for me to make the judgments than before. Still I think I made them in the same fashion as before, letting myself go, giving myself up to the tonal pair and letting myself be affected by them, either the one way or the other. Once or twice I noticed with very high tones a strain in the right tympanic membrane.

Record XXIV. 231st to 240th pair

This time it was easier for me to make my judgments. Nor was I bothered by organic sensations. I just feel comfortable, and if a tone does not disturb me in this feeling I call the tone more pleasant. I don't remember any associated ideas or trains of thought; I was simply passively listening.

Record XXV. 241st to 250th pair

The situation was much as before. There is hardly anything to add. Twice, after the judgment was made, it occurred to me that I have heard the same tonal interval once before to-day, but this consideration did not influence my judgment.

Record XXVI. 251st to 260th pair

My general mood was not quite so stable this time. The noise outside from the wind seemed to make me feel somewhat restless. Nevertheless, I tried to be as calm as possible, and to make my judgments purely on the tones themselves, abstracting from the noises.

Record XXVII. 261st to 268th pair

Was very much less disturbed this time. Do not remember having heard the wind. Hence judgments were made more easily. My mood was quite restful and calm, and neither organic sensations nor trains of ideas were noticed.

Record XXVIII. 269th to 276th pair

Much the same as before. Only toward the very end it occurred to me that these were the last judgments, and I felt somewhat anxious about whether I had completely analyzed the situation or not. But when I look back I cannot find anything I left out, and I know now just as little as at the beginning why I like some tones better than others. It is just simply the way they affect me; and I imagine under other circumstances they would affect me quite differently.

We now proceed to an examination of the above introspective records.

I. In the case of this observer, the following five factors in, or determinants of, affective judgment may be distiuguished.

(1) Reflection on the different attributes of the two tones. "Judgment was arrived at by reasoning about the different attributes of the two tones; for instance, the one tone was smoother, more evenly blown (intensively):" Record I. This factor is also mentioned in Records II, V, VI, IX, X, XV, XVI, XXII.

(2) General condition or mood. "Now whichever of the two tones was more confirming in this, or whichever was less disturbing, was felt as the more pleasant." Record III. "Which of the two tones would disturb me less, or to which of them could I adapt myself more perfectly and more easily? The answer coincided with the more pleasant tone." Record XX. This factor is referred to in all records, except VI and VII. In IV, VIII, XXII, XXIV, XXV, and XXVIII, the word 'mood' is not employed, but the operation of the factor is distinctly implied.

(3) Associations. "Associations aroused by the tones also some-

times decided the affective judgment:" Record V. See also Record VII.

(4) Bias or prejudice. "I am somewhat biased in favor of the lower tones anyhow:" Record VI. See also Record XIV.

(5) Breathing and pulse. "By more quieting I mean that they seem to have a slowing effect upon breathing (and perhaps on pulse as felt in temples)." Record VIII. Such facial expressions as frowning, twitching in the eyelids, etc., are also recorded, but are looked upon as concomitants only. And it should be noted that during the experiments of Record VIII, the observer was trying to quiet down after a fast walk.

II. Critical changes in the course of introspection. In accordance with his understanding of the instruction given, and in accordance also with his personal interest in discovering the basis of the affective judgment, the observer entered upon the experiments in a distinctly analytical attitude. He had often spoken in conversation of the 'inferential' nature of pleasantness and unpleasantness; and he now set systematically to work to find a 'reason' for the affective judgment. Such a 'reason' was first found in the different attributes of the two tones. In the first 20 comparisons, judgment was for the most part passed on this basis.

At the 21st comparison, however, the observer abandons this reflective attitude for an attitude that must be characterized as its direct opposite. The following quotations will show what is meant. "Closed my eyes, took the most comfortable bodily position, and let myself go entirely. Kept all foreign ideas out of my mind, and tried to keep myself in a perfectly constant and unchanged mental and bodily attitude" (Record III). "The only way I seem to be able to judge real pleasantness and unpleasantness is to let myself go entirely, to become passive, and to remain in a very constant, even half-sleepy mood" (Record XVIII). "My general mood was an easy let-go feeling; no organic or other sensations disturbed me" (Record XXI). The attitude is now that of passivity or receptivity; analysis and reflection have disappeared.

Under these conditions, the observer recognizes that the affective judgment is prompted directly by the external stimulus. "In these cases the pleasantness was usually decided on the basis of some quality in the two tones; there seems to have been an entire absence of organic sensations, as far as I remember" (Record V). It should be especially noticed that the records nowhere (save in the one doubtful case of Record VIII)) suggest the mediation of the affective judgment by organic sensations; see, *e. g.*, Records XIII, XV, XIX.

The search for a 'reason' has not, however, been given up. The observer is perplexed that the judgments attach thus directly to the stimulus, and mistrusts his observation: "I am at a loss to say why I liked one tone better than the other" (Record VI). He accordingly introduces a change in his method of observation: thinking that the explicit formulation of his judgment on the tones might lend an appearance of directness to the affective reaction, he now allows the tones to make their impression upon him without writing down a judgment at all. But the character of the judgment remains the same. Henceforth, therefore, the mood of passivity becomes the essential condition for the pure affective judgment, and the intellectual cues are relegated to a secondary place. Introspection furnishes the warrant. "The judgments arouse sometimes ideational associations, but these come rather *after the figure is written down*. Sometimes also, *after the writing*, I catch myself reflecting on other qualities of the tones compared" (Record XIX). And, this warrant once acknowl-

edged, the whole task becomes simpler and easier. "It seemed much easier to make the judgments, except in the doubtful cases" (Record XXI. There were 27 doubtful cases in the total number of 276 comparisons). "This time it was easier for me to make my judgments" (Record XXIV). Finally, the observer declares that "I know now just as little as at the beginning why I like some tones better than other. It is just simply the way they affect me" (Record XXVIII).

III. Conclusion.—It seems clear, from this examination of G's observations, that he passes his P-U judgments directly and immediately on the basis of the stimuli and of these only. The ideal conditions for the experiment are a mood of passivity or listlessness; an undisturbed bodily attitude and state; and freedom from intruding or distracting ideas when the series begins. There is apparently no mediation of the affective judgment by organic sensations.

G himself, unwilling at first to believe that the affective judgment is prompted directly by the stimulus, and confirmed in his scepticism by the nature of the instruction, attempts to find—almost one might say to manufacture—an intellectual basis for the judgment. He thinks that there must be a 'reason' for it over and above the mere quality of the tones. So he has recourse to 'smoothness', or to the 'tone which is nearer a pure tone', etc., varying his report in all sorts of ways, but always seeking for some intellectual construction of the affective judgment. That this search for a 'reason' is a search for what does not exist is clearly shown by the later introspections. G gives up his endeavor to find the 'reason', even while he would still like to find it, and is finally satisfied to take the stimuli as they come. He has tried various logical constructions (associations, organic sensations, power to distract, general disturbance of mood, etc.), and his efforts having been unsuccessful, he renounces the mediation of the affective judgment, and at once the "work is easier". Here, then, is an observer who at the beginning distrusts the immediacy of the affective judgment, and tries to argue himself out of it by all possible means; but whose own introspections, given by the way, convict him of immediate judgment as it were against his own will.

The second observer, Miss M. C. West, is graduate fellow in the department of psychology. Like G, she had already taken part in extended affective studies. W is also musical.

An examination of the introspective records of this observer seems to justify the distinction of two main classes of affective judgment: the associative and the direct. The direct judgments are again divisible as (1) judgments prompted by the tones themselves, with or without certain concomitant processes (especially organic sensations), and (2) judgments prompted by other motives than the tones.

I. The associative judgments

1. The tones were judged on the basis of their 'fitting in with the mood': they seemed to be what the observer wanted; she wanted to sing them; while in the tones themselves, as qualitative processes, there was nothing unpleasant, and nothing strikingly pleasant.

2. Certain middle tones were pleasant, because the observer had the same sense of ease (or absence of strain) and rest, in hearing them, that she would if she were trying to sing them.

3. Tones were unpleasant because agressive, forcing themselves on the observer, seeming not to fit in with or belong to the disposition of consciousness.

4. Tones were unpleasant because too loud or sudden, 'ruffling' the observer 'all up'. Or because harsh and rough, 'keeping her on edge'. Or, again, because nasal and twanging. In all these cases associations were set up, along with the obvious arousal of organic sensations. "The ominous association with the sound in some of those lower notes seems to make them more distasteful than even very shrill, thin high notes that I usually dislike most" (Record III). "The first tone in the pair 75 had an arousing effect through the association of a trumpet call that was solemn in nature and therefore unpleasant" (Record XVIII). "I am pretty sure that the gruffness and roughness of some lower notes may be unpleasant partly through associations with hoarseness and with people of rough low tones in speech, who are often cross and disagreeable people" (Record XXV). "Some of the deep rough tones were judged so not by strains but by a sort of mood they threw me in, of depression and fear" (Record IX). "Many of the notes are judged pleasant or unpleasant by associations, I think, such as Christmas horns, whining animals and people, roaring lions, etc., according to the associated mood these objects set up" (Record XIII). "None but sweet notes seem pleasant to me unless because of associated mood" (Record XVIII).

II. The direct judgments prompted by tones

The nature of these judgments will be clearly seen from the following quotations. "I don't know by what means I judged that I liked it. Maybe I thought 'clear, full, sweet,' maybe I thought of flute notes; but I don't think I did. Maybe I judged by the absence of things that made me shrink" (Record IX). "The high notes seem unpleasant in themselves, but it may be only that the unpleasant strains are more local, in the region of the ear. I can't make out whether the unpleasantness is the strains or not" (Record VI). "The unpleasantness seems to come in at once. There is a kind of jarring which is unpleasant, though I don't think I call it that; I could as easily call it jarring as unpleasant, but I don't think I call it anything. It is just a feeling that I can't sit still and listen to it" (Record VI). "They seem unpleasant from the first, and I can find no word or judgment in consciousness. I caught myself making a mental grunt" (Record VI). "Can't tell what made 71 [the first tone in the pair] pleasant or sweet" (Record XVIII). "I think some tones are pleasant and unpleasant to the ear itself, not counting strains around the ear or unpleasant vibrations, which are not always present even when the tone is unpleasant" (Record XX). "Some very high tones are unpleasant just because they are high, without being shrill or causing any particular associations" (Record XX). "The organic sensations in the case of pleasant tones seem to follow the affective judgment and do not seem to be its basis. They seem to create a desire for more, and a restlessness; their pleasantness is not created by this relaxation, etc." (Record XXV). "Caught myself saying 'don't like it,' but generally noticed a shrinking, wincing, turning of head away without any words or thought; but I can't tell whether those movements were the unpleasantness, or their sensations were the unpleasantness, or whether there was a distinct process of unpleasantness" (Record V). "There were three tones there that I just liked in themselves, and when I asked why, the words 'full, rich, sweet' came. It had something to do with the pitch being a medium one (not associated with the strain of high pitch), but it was more than that. They were accompanied by no perceptible organic sensations and no ideational associations. They seemed to satisfy, and a deep breath followed as a result. The ear lingered on them and tried to hold them and one

wished they would continue" (Record XXIII). "In the pair 262, there was not anything except the tone itself which was agreeable. I liked the tone. I am not even sure that it was full or resonant or had any of those associated attributes which might be a basis of judgment. I noticed that the nasal quality of both tones in the pair 264 [g^1 b^1] set up no detectable vibrations and strains and had no observable associations, but when I asked why unpleasant, I merely answered 'nasal.' It seemed as if the inharmoniousness of the tone itself were directly unpleasant to the ear drum. Nor was the roughness in the first tone [F] in the pair 266 [F-e] unpleasant because of associated hoarseness; but it seemed to have thickness and roughness, unpleasant just as the nasal tone was to the drum itself" (Record XXIII). "I tried to think what made 33 so pleasant to me but I could not. I think it put me in a pleasant mood but why, or why the mood was pleasant, I do not know. I know that relaxed organic sensations had something to do with it" (Record XIV). "1 in each case gave no disagreeable strain sensations and was in no distinguishable way otherwise unpleasant than by the gloomy mood it induced" (Record XV). "The very deep tone in 57 seemed to be judged disagreeable instantly from a general dislike of very deep tones, not because it was intrinsically very disagreeable" (Record XVI). "The judgment is nearly always made on the basis of degrees of unpleasantness. No tone seemed really pleasant. It was a matter of release from unpleasant. [c and g^3] in 61 and 62 were rather sweet, possibly because of no strain" (Record XVII).

III. The direct judgments prompted by other motives

The principal motives to judgment in this class were organic sensations of ear strain, nose tingling, tendency to shut ears, vibrations in head, nose, ear or chest, hitting or piercing of ear-drum or head, head-wincing, etc. "The shrill notes that I did not like were sometimes judged so by ear strains that seemed to go down to my toes" (Record IX). "In some cases I judged it was unpleasant by means of strains, as in the pair 100, a high shrill tone that made my nose tingle and my eyes shut, and I did not like it because of the strain, I think. On the other hand there were twangy tones that were unpleasant because of something else, I don't think it was strain, but an unpleasant vibration set up somewhere in the head, nose or ears" (Record X). "One note seemed to pierce the ear drum and made me want to put my hands to my ears. My head distinctly winced. Other twangy tones set things vibrating around nose and ears, which was unpleasant. Other rough low tones caused a disagreeable vibration somewhere (could not localize it); seemed perhaps in the chest; it was unpleasant. In all these cases it seemed more the organic sensations that were unpleasant than the tones" (Record XI). "Very disagreeable to the ear, induced reflex of head, felt as if things were hitting the drum and piercing the head" (Record XV). "Sometimes the judgment is entirely based on organic sensations of strain and disagreeable vibrations in face and ear; sometimes apparently localized in drum, those seemed squeaky; sometimes across nose and face, those seemed twangy" (Record XVI). "Based largely on strains, contractions of muscles and ear and nose vibrations; sometimes in body (chest particularly) also" (Record XXII). The last quotation that we shall make shows a mixture of motives. "In every instance the unpleasantness seems to be derived from something else, organic sensations or a foreboding mood. It is possible that the pleasant tones also were judged so by comparison with a standard of clarity of tone which I considered beautiful and which was gained from opera

singers and from musical instruments. I think the absence of jarring organic sensations is one thing in the pleasantness of a tone. I don't know whether the rest is an inference according to some standard or not" (Record XII).

CONCLUSIONS FROM W'S OBSERVATIONS

This observer is much more liable than G to organic sensations. And she has fallen into a rather natural mistake: she thinks that, if she can put her finger on some accompanying organic sensation, she has found a 'reason' or 'basis' for the affective judgment. But, of course, we have to ask how an organic sensation is judged pleasant or unpleasant, just exactly as we ask how a tone is thus judged. In fact, if we abstract from the cases of association, the affective judgment seems to be immediate (there were only five 'doubtful' cases out of the total number of 276 judgments). The immediacy is, however, of two kinds. The affection may attach (1) to the tone itself, without there being any assignable 'reason' for it to do so; it just belongs to the tone: or it may attach more prominently (2) to the organic reverberation set up by the tone. It is clear, indeed, that this observer wished to find a basis for judgments in organic sensations, just as G wished to find a basis in intellectual factors. She succeeds better than G, in the sense that she often finds the P-U judgment attaching to organic sensations set up by the tone, while G had no success with his logical reflection. But she offers no 'reason' for this attachment of P-U to organic sensations; so that really the judgment is as immediate as it is in the many instances in which the tones themselves are pleasant or unpleasant.

W's introspective records are not given here in full, since they are far more homogeneous than those of G, and offer no similar possibility of varying interpretation.

We have now to compare the general result, gained from the study of these introspective records, with the conclusions drawn by Titchener and Hayes, so far as these are relevant to our problem. "Judgments of P-U," these authors report, "were easy, direct and natural. It was exceptional to find any reason, any basis for these judgments: the stimuli were intrinsically pleasant and unpleasant, more pleasant or more unpleasant than their neighbors: and when a reason, or a basis was found, outside of intrinsic affective tone, it lay in the organic reaction set up by the stimulus employed."[1] So far as directness or immediacy of judgment is concerned, the outcome of the different investigations is strictly comparable. And even on the score of ease and naturalness there is some possibility of comparison. It is true that a judgment might be difficult, straining, and yet be immediate: that would be the case, *e.g.*, when the state or process to be judged lacked clearness, was faint or indefinite or fleeting. On the other hand, since it must be impossible to analyze, or to pass mediate judgment upon, a mental process which is in reality simple and ultimate, judg-

[1] Titchener: *Psychology of Feeling and Attention*, 1908, 165. Hayes: *A Study of the Affective Qualities*, *Amer. Journ. Psychol.*, 1906, 389.

ment under such circumstances will become unspeakably easier and more natural as soon as the attempt at analysis is given up. In this sense, ease and naturalness of judgment become a test of the simplicity of the process in question, and thus a test of the immediacy of judgment itself. The test is especially applicable to the situation in which the observer G found himself placed during the latter part of the experimental series reported above.

As regards the primary issue, of immediacy of judgment, the evidence of the earlier studies was, of course, not conclusive, and was not stated as conclusive. The spirit of the instruction given, and the mode of treating the observers' judgments (the procedure of 'make-up' series), may even be said to have put a premium upon the immediate affective judgment. The stimuli judged directly affective under these conditions might prove to be only indirectly affective under another form of instruction. Hence it was plainly necessary to supplement the earlier work, in which judgment was called for on the ground of the stimuli, by experiments in which the observer was required to introspect the affective judgment, with a view (if possible) to the discovery of its 'basis' or 'reason.' If the immediacy of the affective judgment is still attested, with this special direction of attention, then it may be regarded as established with some degree of certainty. But this is precisely the result to which we have been led. And it is a result, be it remembered, which is entirely opposed to the initial expectation of the two observers.

But, it may be urged, these observers speak in fact of several bases or reasons for their judgments, over and above the mere quality of the tones, and beside the organic reverberation set up by the stimuli. They appeal to various secondary attributes of the tones, such as their smoothness, purity, etc.; to general disturbances of mood; to associations; to a bias or prejudice of general like or dislike; to the sense of fitness; to the mood temporarily aroused by the stimulus; to some relation, of contrast or what not, to other affective or sense qualities; to motor tendencies, and to actual movements. That is true. It is, however, equally true that these bases or reasons are for the most part directly attributable to the interpretation put upon the instructions given, an interpretation dictated by the observers' personal interest in the explication of the mechanism of the affective judgment. The immediacy of that judgment is, nevertheless, plainly brought out, even against their inclination, and in spite of a reflective attitude that was unfavorable to any immediate experience. Had they passed their judgments, throughout the experiments, under the ideal con-

ditions of passivity and receptivity, practically all of these judgments would probably have been immediate.

We do not deny that there are cases in which an indifferent stimulus may be affectively judged by association, or in terms of some bias or prejudice. An indifferent impression may be judged affective through its relation to some other, vividly affective experience; a 'blunt meaningless tone', for instance, may become unpleasant by contrast (the term in its widest sense) with a 'full rich tone', the bluntness and meaninglessness being simply the result of association. Or again, the impression may be more or less affectively colored, intrinsically, and yet may be distinctly modified in its affective intensity or quality through bias or contrast or any other form of association. There are many cases, among these associative judgments, in which the observer cannot be sure whether or not there was any affection attaching to the stimulus as such, but is aware only of the affection attaching to the associated ideas. All these facts we admit. But we assert that, in general, these mediated judgments tend more and more to disappear as the experiments progress and the observers gain in practice. Associated ideas, permanent likes and dislikes, the 'sense' of fitness or congruity with the present contents of consciousness,—all these things are secondary criteria, which the observer at first, in his comparative helplessness, avails himself of, but which he learns to disregard as his familiarity with the problem in hand increases. The very same stimuli which are now judged by their associates are presently ranked in terms of their intrinsic pleasantness or unpleasantness. There can be no doubt of the immediacy of the affective judgment; there can, we think, be no doubt that the various experiences offered from time to time by our observers as the 'basis' or 'reason' of the affective judgment are of the nature of disturbing factors, that should so far as possible be eliminated from an experimental study of that judgment; precisely as, in psychophysical work, the influence of association and the admission of secondary criteria are ruled out by experimental arrangement and by the shaping of instructions. The tones are judged pleasant or unpleasant with the same directness with which they might be judged loud or faint.

Experiments with Colors

In the earlier studies of the affective tone of colors, the problem was the determination of preference, and its systematic expression in quantitative terms. Neither Cohn nor Major, for instance, gives us any definite information as regards the mediacy or immediacy of the affective judgment. Thus, Cohn says only:

"Der eine [Beobachter] wird rasch zugreifend entscheiden, der andere lange hin und her schwanken, das einmal gegebene Urtheil wieder zurückziehen und schliesslich zu keinem oder doch nur zu einem unsichern Resultat gelangen. Häufig hört man gerade im Anfang, dass die Sache doch wohl bekanntlich subjectiv und unsicher sei, dass man sich der Verwendungs-Associationen gar nicht erwehren könne und dergleichen mehr. Wenn man dann wieder und wieder hervorhebt, dass es sich ja hier nicht um eine Geschmacksprüfung handele, dass jedes Urtheil gleichwerthig sei, es möge nun ausfallen wie es wolle, dass es nur darauf ankomme, den augenblicklichen, unmittelbaren Gefühlseindruck wiederzugeben, so gewöhnt man seine Beobachter allmählich an ein ruhigeres Verhalten. Und diese gleichmässigere Gemüthslage ist ein unabweisbares Erforderniss zum Gelingen der Versuche. Handelt es sich doch bei denselben um einen ziemlich complicirten psychischen Process. Der Beobachter soll die ihm gebotenen Sinneseindrücke möglichst ohne Reflexion auf sich wirken lassen und er soll dann diesen rein gefühlsmässigen Vorgang in die intellectuelle Form eines Geschmacksurtheils kleiden. Es besteht also die Gefahr, dass jener intellectuelle Urtheilsvorgang gewissermassen vorweg genommen werde, dass der Beobachter sich Theorien mache und unbewusst nach diesen sein Urtheil bilde."[1]

These sentences point out difficulties of method; they do not help us greatly to an understanding of the nature of the affective judgment. Major's notes, under the heading *The Affective Judgment*, practically coincide with those of Cohn. He noticed the tendency to theorize, to put reflection in the place of direct experiencing; and the difficulty of obtaining a 'gleichmässige Gemüthslage' from his observers, due partly to the confusion of the æsthetic with the affective judgment, the conviction of the 'subjectivity' and uncertainty of the experiment, etc., and partly to the unaccustomedness of the required judgment. He also noticed the influence of mood. Major's observers sent all impressions alike up towards pleasantness when they were in 'good spirits', working on a pleasant day after much wet weather, etc.[2] So Cohn's "vier verschiedene Beobachter erwähnten gelegentlich, dass sie dieses oder jenes Urtheil abgäben, wiel die betreffende Farbe oder Farbencombination ihrer augenblicklichen Stimmung besser entspräche. So wurde auch einmal ein Gleichheitsurtheil durch die Aeusserung motivirt: 'man würde je nach der Stimmung bald das eine bald das andere schöner finden; verschiedener Gefühlscharacter, darum sehr schwer zu entscheiden'. Ein Beobachter hob hervor, dass ihm bei guter Stimmung die Unterschiede viel deutlicher zum Bewusstsein gekommen seien, als bei schlechter".[3] For this reason, Cohn finally decided not to appeal to introspection. Indeed, both he and Major found it necessary to work towards mechanization of the judgment process during the experimental hour. They both noticed that the number of distracting associations decreased as the experiments progressed. But we are not informed whether or how the associations influenced the nature of judgment. Some of Cohn's observers, again, seemed to be influenced by the serial order of experimentation; a color or color combination might be judged pleasant simply because it was strikingly different from the preceding, unpleasant

[1] *Experimentelle Untersuchungen über die Gefühlsbetonung der Farben, Helligkeiten, und ihrer Combinationen*, Philos. Studien, X, 1894, 596-597

[2] *On the Affective Tone of Simple Sense-Impressions*, *Am. Jour. Psy.*, VII, 1895, 61-62.

[3] *Op. cit.*, 598.

color. But this sort of influence may fundamentally change the nature of the judgment.

Our own experiments with colors, like those with tones, were planned solely with a view to the better understanding of the affective judgment. The experience gained in the harmonical experiments made it possible for us to put a series of definite questions to the observers,—who, however, were notified that they should by no means consider themselves bound by the order of the suggestions, nor feel obliged to state their observations on all points during every introspective interval, but that they should observe and report as opportunity arose, and supplement the questions set in any way that occurred to them. The method employed was again that of paired comparisons. The judgment was passed in terms of P and U; the observers reported which of the two stimuli was the more pleasant, or (if both were unpleasant) which was the more unpleasant. The 26 (Milton Bradley) colors employed were combined in all possible ways, thus giving a series of 325 pairs.

The whole series of 325 pairs was given in precisely the same order to both observers, who in these experiments observed separately, sitting at a distance of 1.5 m. from the windows (3x3 cm.) of the neutral gray exposure apparatus. The experiments were made during the months of January, February, and March, 1908. They were performed in ordinary diffuse daylight in the same room of the laboratory; every care was taken to keep the light as constant as possible, by the adjustment of white curtains at the windows of the room. The time of exposure of the colors was 5 sec.; the interval between observations, during which the observers recorded their judgments and could make short introspective notes, was 10 sec. After every 5 comparisons, they were required to write out full introspective reports, without any definite time limit. Miss West and Mr. Geissler again served as observers. We begin with an examination of W's records.

Of the total number of 325 judgments passed by W, 266 were immediate. W now terms these direct judgments 'affective' or 'purely affective.' They are all phrased in much the same way; the following may serve as illustrations. "I think the judgments were certainly purely affective; I could give no reasons why, and felt no organic sensations throughout these experiments, except consciousness of deep breathing when I liked the color and of movement away from the color I disliked." "Both colors in the pair are horrid to me; one perhaps less than the other because 'less like purply' I said, but I really think it was a purely affective judgment. 'Less purply' was no reason." "I hated the dark buff [in no. 40]. It is a color seldom or never seen and I had no prejudice against it or association with it; it was an affective judgment."

There were 35 mixed reports of the following kind, in which, never-

theless, immediately affective judgments appear to be comprised. "There was a distinct prejudice against the color at the right hand side, but also there was an immediate dislike of it." "I think there was a distinct prejudice from preceding judgments that I should like the pure yellow better than the orange; but perhaps I also liked it immediately." "In the third pair there were also intellectual judgments that the oranges were too bright, but I think an immediate judgment that the red was the more pleasant came first, and a feeling of irritation with the orange." "After deciding that I liked the pure yellow there came the thought 'but see how bright they are,' which though I think it modified my liking did not make me find the yellow unpleasant." "In no. 4 I immediately liked the greenish yellow and then I thought 'but is not that the ugly bilious green you do not like?' but it did not make me dislike it." "I had an image of robin's eggs with the blue green, which was almost inseparable from the color itself, and made me like it better than I would otherwise." "In 56 the thought of yellow satin dresses and yellow ribbons, and the good times I had had wearing them, made me like better the yellow which I think I liked anyway." "The yellow in 68 I did not like at first, but suddenly there came a vivid recollection of the sunshine on the wet grass in the picture of a French artist whom I like, which made me like this green and the greens in 69 and 70." "As the blue violet reappeared in 74 I could hardly make myself look at the other color to see whether I liked it or not. I forced myself to ask, why do I like it? and I answered 'soap bubbles' and then 'Frenchman's pictures of the Seine and The Tower of London'; but these associations came later and brought a new kind of pleasure, not so absorbing but more acute." "There are certain shades I noticed that I dub 'artistic', I don't know why. This may be an individual feeling that a dull color that I like is artistic. It may be some forgotten association. I believe the soft shades, the mixed shades, may usually be called art shades and the dark soft shades especially so. I should not call the buff artistic though I like it. But the dull green in 44 as well as the pea-soup color may derive its likableness partly from codes of art got from custom. Yet I think there is a strong immediate affective judgment there too, as there is in the buff which is not called artistic." "The contrast in 90 made both less pleasant than they would have been separately, made them seem too dark and too light." "The contrast in 95 made both worse. In spite of the prejudice in favor of dark colors, the color at the right in 94 though dark seemed horrid to me; I could not bear to look at it." "The contrast in 137 made both worse. I could not decide which I disliked more, could not make myself continue looking at them, eyes passed rapidly back and forth and then fell." "I seem to have certain codes already established as to what I do or do not like in colors; I know I like dull colors and a blue violet. Yet I think that these decisions were made on a purely affective basis."

The remaining 24 judgments were, perhaps, more definitely associative in character. "These judgments were all mediate, and the associations of eggs and grass rendered it difficult to decide which I liked of the two in 21." "Usually the judgment is instantly made, perhaps largely by prejudices which may have been affective judgments at first or may have been determined by convention and usage. These prejudices are very decided and act at once and without hesitation." "There was a distinct association of biliousness and caterpillar juice with that yellowish green which made me reject it, without liking the alternative color especially. The bright greens and yellows seemed too crude, but the mixed green and yellow was nasty (whether it

was unpleasant in itself I cannot say), and I don't think the associations crowded up with the yellow green; only I had evidently decided that that color was nasty and repulsive from its associated objects." "But these affective judgments have settled into such codes that the judgment may not be purely affective any longer." "When I had up the preferred dull against the preferred brighter but bluer violet, the lack of affective elements came out more strongly; it seemed to be a matter of which judgment of liking did I cling to more tenaciously, dark colors, or blue violets." "I think I do have an initial attitude of readiness to embrace or to be repulsed by the color. I think this attitude is followed by a movement toward or away from the color."

It seems fair to conclude that the affective judgments of color impressions are or may be immediate; the great majority of W's judgments were, as a matter of fact, passed without any mediation.

W states that her attitude in observation may be that of active attention, in which event she uses the terms "like and dislike", or that of passivity and receptivity, in which event the terms "pleasant and unpleasant" suit better. She says also that it may make a difference, not only in the ease and rapidity of judgment, but also in the judgment itself, whether the attitude is active or passive. "Most of these decisions are made instantly and with no trouble whatever in both the active and passive state, but when a difficult decision has to be made it is much harder and slower if the mind be passive. I think that more associations come with the passive state, but I am not sure of this. When pale blue and yellow were compared I liked the blue better in the passive state and the yellow better in the active. The blue caused me less excitation and was more pleasant. The yellow I liked better, and found more delightful if I took the trouble to enjoy it. There was not much I could do with the blue; it was just there."

The observer G at first assumed the reflective, analytical attitude of which we have already spoken; the result was that in the early stages of the experiment he often found very little to choose between the colors, and his judgments were frequently doubtful. However, he soon became convinced of the immediacy of the affective judgment, and thenceforward found it easy and prompt. Of his 325 comparisons, 272 were of the direct type. The following illustrations may suffice. "The greater pleasantness in nos. 16, 18, and 19 was quite pronounced. I felt really pleased by the colors as such; no secondary criterion seemed even to lurk in the background." "I had an idea that there would be many more doubtful cases than I have had so far. Usually, however, it was not difficult for me to decide. I noticed no bodily processes whatever, and cannot remember anything that entered consciousness during the attention to the colors." "It was not difficult for me to decide, but I am vexed if one asks me how and why I like one color better than another. I am sure in this series there were no associations, except perhaps that one chocolate-brown called up an image of the wrapping of Hershey's Chocolate. However this did not influence my judgment." "With one exception judgments seemed easy, immediate and unhesitating. Usually I had made my preference before the second signal came." "I believe I could reconstruct a great deal of the background of memory or reason or both, but don't have the faintest idea that this would help me in deciding why I liked one color better than another." "The pleasantness in these colors was not pronounced. Yet I had no difficulty in deciding which I liked better. There were no associated ideas, nor any verbal or visual images connected with the stimuli sometimes." "I am still at a loss to tell how I prefer and why I do so. The background processes of consciousness don't seem to have anything to do with it. The

two colors are in the focus of attention, the rest is almost unconscious." "The judgments came quickly and immediately, without interference of associated ideas or any other conscious processes." "The degrees of preference seem to be quite distinct to-day. Nevertheless the judgments are made immediately and without deliberation. It is only after the decision that I begin to make distinctions as to greater or lesser degrees of preference."

The remaining 53 judgments were of the following kind. "In no. 13 the right color was constructed or synthetized out of the left *plus* a little red, just enough to destroy the pure saturation of the right in comparison with the purer left color. The same consideration influenced also my next judgment, where the same color was to be compared with another." "I think I judged more the saturation. In this, however, my judgment was immediate. But at the beginning I could not avoid a short reference of the two colors to circumstances under which they had been seen before. Also in nos. 24 and 25 I judged more the saturation." "Again the purer colors were preferred. The third pair was distinctly judged by saturation." "The judgments were easily made simply on the basis of color-preference, no other criteria seemed to enter except in no. 219, where the left was rejected on account of its poor saturation." "The preference was quite easy, based on an immediate æsthetic pleasure derived from one color, sometimes on account of its shade, where saturations were about the same." "This was a plain preference of better saturations. Why I like them better I am unable to say." "In the very first comparison the judgment was not so much on the color as on the brightness. The suggestion of clear and dirty influenced the decision. In a less degree also the second pair was judged in this way. The real affective tone was very slight."

W, as we have just said, reports an oscillation of active and passive attention in the color work. G, who in the harmonical experiments insisted strongly on the advantages of the mood of passivity and receptivity, now reports, throughout the series, an active concentration of attention upon the stimuli as most favorable for the passing of the affective judgment. As a rule, he entirely failed to notice what was going on in the background of consciousness while he attended to the colors.

For G, there is no difference in the judgments expressed by 'pleasant' and 'like', 'unpleasant' and 'dislike'. Here we seem to be in presence of an individual difference between the observers. The general tendency to a passive reception of tones and an active attention to colors may be ascribed, with some confidence, to the different impressiveness or attention-compelling character of these stimuli. The tones are, without doubt, more striking, less escapable than the colored squares.

The results of these two sets of experiments appear to warrant the conclusion that affective judgments may be and usually are as direct and immediate as the sensory judgments of psychophysics.

II. The Method of Single Stimuli

The experiments which we are now to report were planned at the same time as those described above, but were made earlier, namely in the months of October to December, 1907. They are postponed to this place, since they lead on naturally

to the further experiments of Section IV, which were performed last of all.

Selected stimuli, twelve cutaneous and twelve olfactory, were presented to the observer in separate series, one at a time and in chance order, for 15, 10 or 5 sec. The method employed is thus that named by Brahn the *Reizmethode*.[1] Our object was, by fitting instruction to the observers, to secure reliable introspective data as to the nature of affective process and its difference from sensation. The stimuli were chosen with a view to their probable affective value, as well as with a view to their perceptual characters; and the observers were asked to take each one as it came, and to say what it did to consciousness,—to give their immediate conscious reaction upon it, without making an effort to identify or to analyze. We hoped that, if some of these reactions were definitely affective and some definitely perceptual, we should be able to appraise the various criteria of affection proposed by other investigators.

It may be said at once that the longer times of presentation of stimulus were rarely utilized by the observers. Only in the case of certain cutaneous stimuli, and in that of a few scents of extreme pleasantness or of unknown quality, was the limit of 15 sec. reached. The aim of the experiment was to secure the immediate conscious response to the stimulus, and in many instances this response was made in 1 sec. or even less. Hence the time was reduced from 15 to 10 sec., and in the latest series to 5 sec.

The cutaneous stimuli employed were (1) sandpaper, (2) heavy plush, (3) glass, (4) rough felt, (5) quicksilver lying in an enamel-ware pan, (6) rubber sheeting stretched over the mouth of a glass funnel, (7) fine sand spread in a flat wooden box, (8) smooth stretched leather, (9) a smooth brass plate heated to about 55° C., (10) ice water, (11) a blackboard eraser, and (12) polished hard wood. On the signal, the observer, seated at a table with closed eyes, made a pawing movement over the surface of the stimulus with the tip of the right forefinger. The olfactory stimuli, contained in similar glass bottles, were (1) carbolic acid, (2) mixed vanillin and cumarin, (3) benzole chloride, (4) listerine, (5) oil of anise, (6) sulphuric ether, (7) essence of peppermint, (8) valerianic acid, (9) violet water, (10) asafœtida, (11) nitro-benzole, and (12) musk. On the ready signal, the bottles were taken in the left hand, and at a 'now' were uncorked by the observer, raised to the nose, and inhaled. Here, as before, the observer had his eyes closed during the experiment; in no case was the

[1] M. Brahn: Experimentelle Beiträge zur Gefühlslehre, *Philos. Studien*, XVIII, 1903, 133. Titchener: *ibid.*, XX, 1902, 404.

introspective record influenced by sight of the stimulus. Every care was taken to avoid adaptation of the organ, or diffusion of an odor in the room in which the work was done.

The observers were Miss West and Mr. Geissler, of whom we have already spoken; Mr. W. H. Pyle (P), assistant in psychology; and Dr. Weber (Wb), a graduate of the University of Pennsylvania.

In their main purpose the experiments miscarried. Whether this miscarriage was the fault of the method itself, or of our selection or manipulation of stimuli, we do not know. We took every precaution that we could think of, and we naturally incline to blame the method. At any rate, what we got was not any clear-cut differentiation, on a positive basis, of affection and sensation, but rather a reflection of the theories and idiosyncrasies of our observers. Thus P entered upon the experiments with the idea that pleasantness and unpleasantness are attributes of sensation, and his introspective records are for the most part couched in terms of this opinion. W, as we have seen, has keen and varied experience of organic sensations; she began the work, not with any definite theory of the nature of affective process, but with the general expectation that it would turn out to be an organic complex; and organic sensations figure largely in her records. G was inclined to look upon affection, in Wundt's early manner, as something relational, perhaps even as the result of an unconscious judgment or inference. It is easily possible, in his as in W's case, to make the prepossession too explicit, to formulate expressly what was in reality only a sort of trend or tendency or line of least resistance; but it is at least safe to say that G's attitude was reflective, intellectually analytic, and not receptive. He was accordingly disposed to note whether the stimulus gave 'objective' knowledge, or whether it produced a 'feeling of change' in the sense-organ; whether it was accepted as informatory, or whether it aroused movement by attraction or repulsion, etc. Under these circumstances, the question which we had set ourselves to answer naturally remained unanswered. The observers did their best, under the instructions given; but the method, as we must think, showed itself inadequate.

We add that all three observers later changed their opinions, and declared for the independent status of the affective qualities. And this change was due, in some part, to the work by the present method. G, for instance, was struck by the objective immediacy of the affective coloring of certain smells and touches; his reflective distinction could not always be carried through. P was impressed by the fact, made known to him at the conclusion of the experiments, that the same smell might appear in his records now as pleasant and now as

unpleasant. While, however, the method of single stimuli may be credited with the impulse to this change of view, it can hardly be credited with more. The change of view was by no means completed when the experiments were given up for the series described in Section I, and we have no reason to believe that the method would have availed to complete it within any reasonable time. The main value of the work—with a single exception to be mentioned later—lay in the practice it afforded for introspection of what were oftentimes vividly affective consciousness.

The remaining observer, Wb, manifested no special interest in affective problems. He had, however, a very strong recognitive tendency, which our instructions failed to inhibit. Wherever possible, he sought to identify the perception; and where this was impossible he turned his attention to a characterization of the stimulus in terms of intensity, duration and associated ideas. No doubt, the recognitive habit would have been broken up in time; but Wb was unfortunately called away from the laboratory in December. We should not, in any event, have continued work with the method of single stimuli, as the three months of practice had no such appreciable effect upon Wb as we observed in the cases of W, G and P.

The one positive result obtained from these experiments has to do with the time-relations of the arousal of sensation and affection. Wundt has recently maintained that the affective process may enter consciousness alone, as the herald of the sensory process with which it is connected.[1] Our results, so far as they go, definitely negative this doctrine. The following table speaks for itself.

			Simultaneity	Sensation first	Affection first
P	Touch	144 obs.	38	106	0
	Odors	144	111	29	1?
G	Touch	72	28	43	1?
	Odors	72	27	27	0
W	Touch	48	16	32	0
	Odors	48	26	21	0
Wb	Touch	96	10	86	0
	Odors	96	57	36	0

The discrepancies between the number of observations and the number of recorded judgments for 'odors' are due to the

[1] Grundriss, 1905, 262 (Engl., 1907, 243); *cf.* Ladd, *Psychology, Descriptive and Explanatory*, 1894, 181.

fact that the stinging, pricking character of a smell sometimes overpowered its odor, and further, in the case of G, to a temporary catarrhal condition which led to a number of reports of 'no smell'. It seems best to omit all observations to which this report was attached, though it is right to say that the pricking sensations always came with or before the associated unpleasantness.

Here, then, are 695 observations, in which there are only two, and those doubtful references to a temporal procedence of affective process. G's touch record (rubber sheeting) read simply "the most pleasant": nothing was said of the smoothness, softness or elasticity which is mentioned in the remaining five observations on the same substance. It seems clear, however, that the judgment was comparative, implying the presence in consciousness of ideas of stimuli previously presented; so that the independent appearance of the affection is not made out. P's odor record (valerianic acid) consisted of the single word "awful!" Here again there is no positive evidence that unpleasantness only, and not an unpleasant odor, was dominating consciousness.[1] On the whole, then, the results speak strongly for simultaneity or for the succession sensation-affection. Either the affection appears distinctly later than the perception, or the two factors are in James' phrase, "beaten up together in one consciousness."[2]

We had anticipated that the cutaneous stimuli would, in the main, set up typical perceptual consciousnesses, and the odors typical affective consciousnesses, although we chose the stimuli with the view of securing both types of consciousness within each sense-department. The anticipation is in so far fulfilled as that, with all four observers, the touch-experiments show a marked preponderance of sequence (sensation first) over simultaneity. Only P's results show, for odors, a similar marked preponderance of simultaneity. This may perhaps be due to P's theoretical attitude to the affective problem, which was, as we have seen, different from that of the remaining three observers. However, the observations are too few to allow of safe inference. Our excuse for their small number is the well-known duration of smell adaptation: we never succeeded in taking more than 12 observations with odors during an experimental hour, and this maximum was but seldom attained.

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[1] It should be remarked that these reports are unusually brief, though (as the observers were instructed to give the immediate conscious reaction on the stimuli, and to disregard later reflection or association) the introspections rarely exceeded half-a-dozen descriptive terms.

[2] Psychological Review, i, 1894, 523 f.

III. Incidental Results of the Foregoing Experiments

Some of the incidental results of the experiments described in the preceding Sections have a bearing upon vexed questions of affective psychology. We now proceed to report them.

(*a*) *Qualitative Differences within P-U.* It is still a matter of controversy whether pleasantness and unpleasantness are the names of single affective qualities, or whether they are collective terms, covering a greater or less number of such qualities. Only one of our observers, W, finds anything like a qualitative differentiation. The remaining observers never reported differences of quality during the experiments, and when questioned on the matter, afterwards, they affirmed that they had found no evidence whatsoever for more than the single qualities, pleasantness and unpleasantness.

W's records for tones are as follow.

I found 94 very hard to compare, because the kinds of unpleasantness were so different. They [the tones] were both unpleasant: the first one caused strains, was thin and shrill; the other was deep and rough, and caused a sort of shudder.—Record X.

I don't know what makes the jarring sensations unpleasant. But I know that we are not speaking of the same thing when we speak of a jarring sensation being unpleasant as when we speak of the ominousness of a tone being unpleasant.—Record XII.

It was hard to say which I minded most, the melancholy mood or the ear strains; they did not seem comparable, but on the whole the strains seemed worse.—Record XV.

In 79 I noted the different unpleasantnesses of a shrill tone giving strain around ear and of a rough tone causing unpleasant vibrations of drum and nasal parts.—Record XVIII.

I noted a great variety of ways of being unpleasant through vibrations in ear and nose.—Record XXI.

Similar reports upon colors will be found under (*d*) below. When asked to comment on these records, at the conclusion of the experiments, W wrote: "I do not believe that I get any affective quality without obtrusive, though hardly analysable, organic sensation; the whole is inextricably blended, appearing as simple as a mood. My liking of red is (as I have said) altogether different from my liking of the color of a hepatica. With red I am excited and satisfied at once (whatever that means in terms of organic sensation; sensations of tingling come, from face and chest muscles especially). The blue-lavender color excites me in a different way: I have an expansion of the chest, with deep breathing, and an unsatisfied feeling: the emotion of 'longing' comes as near to this as I can describe, though the two feelings are not identifiable. I believe that I ought to say, on reconsideration, that the judgments of qualitative difference in affective quality refer always to this kind of blend of affection with (only very partially ana-

lysable) organic sensation. The organic sensations are very lively in me." It is, then, quite possible and even probable that the qualitative differences in question are sensational and not affective in their nature.

(*b*) *Mixed Feelings.* W is again the only observer who reports a mixed feeling, that is, a simultaneity of pleasantness and unpleasantness. The remaining observers are strongly of the opinion that mixed feelings do not occur. The records are as follow.

> One of those tones, though unpleasantly twangy, had an associated idea of a bugle call to action, which was both pleasant and unpleasant, but was at least more satisfactory than the thin meaningless tone with which it was compared.—Record XXV.
>
> There was something in the second tone of 162 that made it unpleasant, somewhat so, in spite of its sweetness; maybe a sort of prejudice against notes very high or very low.—Record XVII. The tone was g^3.

There were no similar reports upon colors. When asked to comment on these reports, at the conclusion of the experiments, W wrote: "I have never theorized or thought about mixed feelings; but I seem often to get them with tones, and I am surprised that they did not appear more frequently in the experiments. You must remember that 'feeling' to me means a blend of pleasantness or unpleasantness with organic sensations. It is possible that some of the organic sensations set up by the tones were pleasant, and some unpleasant, and that in recalling the experience I gave as simultaneous what was not so in reality. I cannot now say, and I do not think that (at any rate with an observer of my type) the method is suitable for settling the question." We had planned to make special experiments with W upon this and the previous point; but the observer was unexpectedly called away from the university, and we were therefore unable to do so.

(*c*) *Affective Localization.* A few cases of affective localization occurred in the experiments by the method of single stimuli.

> G. Rubber membrane. The pleasantness seemed to be localized entirely in the finger-tips.
>
> G. Carbolic acid. The affective tone seemed to be localized only in the mucous membrane.
>
> P. Vanillin-coumarin. It seems as if the pleasantness is a separate sensation in the nose, different from the odor proper.
>
> P. Valerianic acid. The unpleasantness seems to be localized in the upper part of the nose.

In three of these reports, the affection is plainly localized along with its sensation; consciousness has, to all intents and purposes, been narrowed down to a single sense-feeling (*cf.* Titchener, *Feeling and Attention*, 336). P's account of a sepa-

rate, sensation-like affection seems at first sight to imply a separate localization; but there can be little doubt that the localized pleasantness attached, in this case, to sensations aroused by stimulation of the trigeminal endings. P often reported, with the pleasant odors, tickling sensations in the nose which were themselves intrinsically pleasant; and, with the unpleasant odors, tickling or tingling sensations. These last blended with the quality of the odor into a unitary complex.

We add, finally, a brief account of (*d*) *individual differences in affective reaction to colors.* The colors employed were: VR tint 2, VR, VR shade 2, R, OR, RO, O, YO shade 1, YO, OY tint 1, OY, OY shade 1, Y, GY, YG, G, BG shade 2, BG, BG tint 2, GB, GB shade 1, B, VB, BV, V, RV. The reactions of the observer G may be summed up as a preference for highly saturated colors that are not too bright, a special dislike for browns of low saturation, and a decided liking for YG. The dislike of little saturated browns was mentioned by the observer; he was not aware of his liking for the YG. Towards the end of the experiments, however, he reports: "The YG was strikingly unpleasant this time, though I remember having preferred it in other combinations." The reactions of the observer W are more differentiated, and appear to be worth a report in full.

Violet red, orange red, and violet blue. I find reds that I like in quite a different way from the violet and blue alone. I don't know whether there is a common element in the way I like all these colors, but I think there is in the way I like the red and the violet, though there is a difference too. The violet has a lighter, giddier, more exciting effect. The red seems merely to affect the retinas more.

Violet red, shade 2. The dull color in 157 seemed restful because of its dullness as well as pleasant in itself. I think there were two elements there, one affective and one organic from eye muscles relaxing or else pleasant to retina itself.

Red (the red is rather dark due to the oxidation of the pigment.)—There came in a faint associated idea that I did not like dark red dresses; it did not, however, make me dislike the dark red. And yet there was no active liking of it; it merely did not trouble me; my eye could rest on it easily; it was dark and faintly restful.

Orange red, red orange, orange, orange yellow, yellow green and blue green. The oranges were irritating and aggressive; the orange yellow was felt clear, pure and restful by comparison with the oranges.

The sort of disagreeableness from the bright oranges is different from that of the blue green or yellow green; the one antagonizes (fights) me and the other disgusts me.

A brighter yellow I did not like at all. I do not like the glare of the bright colors; they almost hurt my eyes.

Orange yellow, green yellow, and red violet. I cannot get anything but a feeling of disgust to those I really dislike, like that green yellow in 100; while the bright clear colors like the orange yellow caused no disgust; they only tired me, and I said the word "crude" with them, they seemed raw and rasping. They gave me a restless feeling of being on edge.

The red violet I disliked most and the green yellow was most disgusting. I know the difference in the feeling, but I cannot analyze it. The disgust was accompanied by movements in the chest and facial muscles, and a sort of dropping feeling. The dislike was more aggressive and the color seemed more aggressive.

Green blue and blue. The green blue in 22 brought a distinct sense of relief; especially when I looked at it from the yellow green.

In 180 there was no dislike to the blue, but a positive feeling of discomfort in the presence to my eyes of such a raw color (lacking gray or white).

Blue violet, and green blue shade 1. At the blue violet in 73 I was conscious of saying "ah" on a long breath, and I think I relaxed all over; I did something all over and it was not a start up. I think I had a typically pleasant feeling there; it was very absorbing and left no room for thinking anything; it was a feeling half of wonder and half of "ah, that's good," and my eyes felt as if they rested on the color and never wanted to leave it. I think there were breathing sensations, and it left a kind of hunger for more which I think was in the chest.

I liked both the colors in 203 and they seemed to present two different kinds of pleasantness. The green blue was restful and satisfactory, altogether good to look at, but unexciting. The violet was exciting. As I looked from the one to the other I felt a distinct change, a lift of the chest, I think, and tightening of facial muscles, and a catch in the inspiration when looking at the violet. There was more than this; a tickling feeling in chest; and besides these bodily feelings there was something else too.

Violet and red violet. In No. 76 I seemed to have succeeded in the discovery of the pleasantly affective attitude. It seemed to me the attitude was nearly that of attention; eyes seemed fixed to the spot and straining out of head; body seemed alert, breath drawn in with a little almost tickling sensation at bottom of chest; all this plus something which I cannot analyze, a sort of buoyant feeling. No crowding in of associations or thoughts that I was aware of. I did like the violet when it came, and I seemed to still expect to like the color in 77, for when 77 (blue vs. red violet) came, I had a feeling of disappointment, a let-down feeling and turning away of the head. I am not sure but that there were muscular contractions in throat as if to spit it out. I am sure there was a general movement of backing off, with turning of head away,

Red violet, and yellow orange shade 1. I got a distinctly unpleasantly affective quality in 85, but when I tried to analyze it only got quivery sensations running up and down my arms and legs. There was a strong disgust for both and it seemed exactly the same in the l. (yellow orange) as in the r. (red violet), although I had no prejudice in regard to the orange. And it seemed intensified as I tried to bring them in at one glance. I think there were feelings in the chest of contraction.

General observations on the affective values of the various colors. The clear, not too bright yellow gives a light feeling; I think it is an idea; an idea of lifting up and lightness; not an actual lifting of the chest and head, but these may be there. I think the eyes open wide, and you feel as if you could look through it; it is exciting, and quite different from the dull blue which is also pleasant. You want to look straight at the blue; it is commonplace but nice. The bright red, again, is pleasant in a different way; it is exciting, but not like the yellow. It is a little aggressive, and you don't want to look at it too long, or look through it. You could not bear to imagine the air red,

but you could stand the air that clear yellow for a little while. The blue violet is exciting, again, but something is added; more organic sensations, and you want to live in it. The pale blue and pale yellow are again pleasant in a different way, but I cannot analyze this at all. The dark green and dark purple red are pleasant, more as the dark blue is, but there is an exciting element in the dark purple red. I should say that the dark purple red, the dark green, the dark blue, the pale blue, and the pale yellow excite æsthetic feelings; this seems to be due largely to the mixture of white and gray. Yet I do not find it in the pink.

Disagreeable blue greens and pink reds and yellow green have an affective quality, which is almost distinct enough to be a sensation; I don't know whether it follows on organic sensations or not. It seems to pierce you; to do something to you and to be very positive.

IV. The Discriminative Reaction

Two methods are at hand for the investigation of the time-relations of sensation and affection. There is, first, the graphic method, in which the observer may register the moment of appearance of the sensory or affective process. The writer made a series of experiments with a simple form of this method in the Harvard Laboratory in the year 1906-1907: the stimuli employed were colors, geometrical figures, and illustrative photographic pictures, and the result was that the affection set in noticeably later than its sensation. These experiments will be reported in a later paper. There is, secondly, the method of reaction. We took, during the months of December, 1907, to April, 1908, a series of discriminative reactions to cutaneous stimuli, which are now to be described. Discriminative reactions to odors were also planned, but for lack of time have not been carried out.

We selected five pairs of stimuli, with the characters: hard, soft; rough, smooth; sharp, blunt; wet, dry; hot, cold. Wooden blocks, 3 by 2 by 1 in., having a slightly raised rim, were used to hold the stimulating surfaces. For *hard* we inserted in the block a plate of sheet brass; for *soft*, a layer of cotton wool; for *rough*, coarse sandpaper; for *smooth*, a sheet of kid leather; for *sharp*, an even field of short tacks, point up (the points were slightly blunted, in order to avoid injury to the finger); for *blunt*, an even field of furniture tacks, head up; for *wet*, water-soaked cotton wool; for *cold*, a sheet of brass cooled in ice-water; for *hot*, a sheet of thicker brass heated to about 50° C. For *dry* we employed the smooth surface of the wooden block itself. The reactions were taken by means of the vernier chronoscope, model II.[1] The stimulus block rested partly upon a support, placed on the table, and partly on the button of the release-key of the longer pendulum. The pressure upon the button was so slight as not to interfere

[1] E. C. Sanford: Improvements in the Vernier Chronoscope, this *Journal*, xii, 1901, 592.

with the working of the instrument. The observer sat with his left hand in a specially prepared rest, grasping the sides of the stimulus block by his thumb and middle finger. The forefinger thus extended over the stimulus surface; and the stimulus was applied (and the long pendulum released) by a single pawing movement of the finger-tip downwards. The forefinger of the right hand rested, of course, upon the button of the release-key of the shorter pendulum.

The observer was given general directions for the performance of the discrimination reaction[1] to the characters hard-soft, rough-smooth, wet-dry, hot-cold, sharp-blunt, pleasant-unpleasant. In the actual experiment, the experimenter would say, for instance: "Hot or cold? Ready!" whereupon the observer would close his eyes, and adjust his two hands to the instrument. As soon as the observer was in position, the experimenter called "Now!" The observer then made the movement with the forefinger of his left hand which gave the stimulus and started the longer pendulum, and after discrimination of the character of the stimulus pressed the key of the shorter pendulum with the forefinger of his right hand. The experimenter counted off the swings of the two pendulums in the usual way.

Preliminary experiments made by the writer and Professor Titchener led us to believe that the necessary manipulations would readily be learned by the observers. As all had had practice in the ordinary reaction experiment, we planned to continue their special practice only to the point at which a set of 25 reactions could be made without error; and we expected that this point would be reached in three or four hours. We were over-sanguine. In all cases, the preliminary practice covered a period of several weeks; and in the case of R, W and C an errorless series could not be obtained at all, and we were forced to rest content with what appeared to be an irreducible minimum of mistakes (too light pressure upon the one or the other key, confusion of the tasks of the two hands). The number of these wrong reactions is shown in the Tables.

The observers were Mr. Geissler, Mr. Pyle, Miss M. G. Rand (R), Miss A. T. Waldie (W), and Mr. W. D. Clark (C). The three last had had two years of laboratory training in psychology. A complete set of experiments comprised 50 stimuli, 30 of which were presented for sensible and 20 for affective discrimination. Great care was taken to distribute the ten surfaces evenly, and to utilize them all in the affective work. The 50 stimuli were so arranged that the same surface was never presented twice in succession, for the two kinds of reaction; and the order of presentation was reversed from set

[1] E. B. Titchener: Exp. Psychol., II, i, 1905, 186 f.

to set. A half-set, of 25 reactions, was taken in the experimental hour.

Tables I and II give the results of 350 reaction-times obtained from the observers G and P; 210 times of sensible, and 140 of affective discrimination for each observer.

TABLE I

Observer G. Unit, 1/50 sec.

	Affective discrimination times						Sensible discrimination times					
Stimulus	Range	Median	MV	Average	MV	Wrong	Range	Median	MV	Average	MV	Wrong
Hard	74-88	80	5.3	80	5.5	0	50-58	54	2.8	55	3.1	0
Soft	56-88	70	10.1	72	11.0	0	34-48	42	3.0	41	3.0	0
Rough	62-86	79	6.9	77	7.5	0	54-76	66	5.1	65	4.9	0
Smooth	76-96	81	4.9	83	4.7	0	54-78	66	6.1	67	6.0	0
Sharp	32-50	40	6.4	43	7.3	1	28-38	34	4.1	35	4.6	2
Blunt	54-86	70	9.2	69	9.7	0	44-58	51	4.5	50	4.7	0
Wet	54-82	71	8.5	69	8.6	0	46-62	55	4.7	53	4.5	0
Dry	80-99	86	6.0	85	5.3	0	54-70	64	4.5	61	4.1	0
Warm	54-82	79	8.7	73	8.6	2	54-86	74	6.1	74	6.3	0
Cold	78-88	85	7.6	84	8.2	0	54-83	71	5.3	67	5.8	0

TABLE II

Observer P. Unit, 1/50 sec.

	Affective discrimination times						Sensible discrimination times					
Stimulus	Range	Median	MV	Average	MV	Wrong	Range	Median	MV	Average	MV	Wrong
Hard	72-86	81	4.6	82	4.4	1	52-72	60	6.4	61	6.8	0
Soft	58-72	62	6.2	64	6.0	1	38-50	42	3.8	44	3.8	0
Rough	80-108	93	12.0	96	12.0	1	50-68	58	5.2	58	5.2	0
Smooth	60-86	73	6.7	73	6.7	0	48-68	53	4.8	55	5.7	0
Sharp	52-64	55	6.0	57	4.7	0	38-48	40	4.1	42	4.0	1
Blunt	84-94	91	14.0	90	14.0	1	46-62	59	5.0	56	4.8	0
Wet	74-86	82	8.0	81	7.0	0	56-76	68	4.9	67	4.5	0
Dry	70-78	80	4.5	75	2.3	1	62-82	73	5.8	75	6.8	0
Warm	71-98	84	7.0	82	6.5	0	70-86	76	4.7	77	4.5	0
Cold	80-100	91	8.5	89	7.7	0	78-94	86	5.3	87	4.3	0

Inspection of these tables shows that the affective discrimination times are uniformly longer than the sensible discrimination times. In general, also, as might have been anticipated, the *MV* of the affective reactions is larger than the *MV* of the sensory; exceptions occur only for *G* with the stimulus *smooth*,

and for *P* with the stimuli *hard* and *dry*. Nevertheless, the *MV* of the affective reactions is by no means abnormally large. And it can hardly be doubted that the affective times represent the observers' discriminative reactions in precisely the same way as the sensory times. The individual ranges are of the same order; and the total range of the sensory times, from 28 with *sharp* to 86 with *warm* for *G*, and from 38 with *sharp* to 94 with *cold* for P, are paralleled by the affective limits 32 (unpleasant) and 99 (pleasant) for the former, and 52 (unpleasant) and 108 (unpleasant) for the latter observer. The Tables, therefore, seem to show conclusively that the affective processes are amenable to the reaction method.

The observer P discriminated the *warm* stimulus sometimes as warm, and sometimes as hot. The average times are:

	Warm	Hot
Sensory:	20 reactions: 78±4.5	20 reactions: 98±7.1
Affective:	15 reactions: 80±6.0	15 reactions: 108±8.0

It would, of course, have been exceedingly difficult, in an experiment like ours, to keep the temperature of the stimulus constant; and beside taking an initial test and carefully regulating the time-relations of the experiments, we made no effort to do so. In so far, then, as these figures depend upon objective differences in the temperature of the stimulus, they are in agreement with Thunberg's statement that the simple reaction-time of heat is longer than that of warmth (*Zeits. f. Psychol.*, xlvii, 1908, 166 ff.). There were a few cases, however, when the effect of the stimulus was not simply warmth or heat, but when the sensory experience began with a warmth, which quickly passed over into heat. In these cases the observer might react at once to the warmth, or might wait for the development of the perception of heat; and the times naturally varied in accordance with his attitude.

The following Tables III-V show the results obtained with the three other observers.

TABLE III

Observer R. Unit, 1/50 sec.

	Affective discrimination times						Sensible discrimination times					
Stimulus	Range	Median	MV	Average	MV	Wrong	Range	Median	MV	Average	MV	Wrong
Hard	34-40	36	2.7	37	2.8	1	28-40	32	3.0	34	3.0	1
Soft	34-51	42	2.5	41	3.0	3	28-44	34	1.3	34	1.7	1
Rough	32-60	39	4.1	40	4.1	2	26-50	36	2.8	37	2.3	2
Smooth	36-55	44	3.5	43	3.5	1	30-46	40	2.8	38	3.0	1
Sharp	29-43	32	2.5	32	2.5	4	26-36	30	2.0	31	2.0	3
Blunt	32-44	36	3.3	37	3.4	2	24-30	28	1.4	28	1.4	1
Wet	32-53	40	3.2	38	3.6	2	30-48	32	2.1	36	1.8	1
Dry	38-48	40	3.5	43	3.5	1	30-44	34	3.3	35	3.4	2
Warm	34-55	40	3.2	41	3.8	2	32-46	40	3.0	39	3.0	1
Cold	46-74	52	4.1	50	4.0	1	30-47	40	2.4	41	2.5	1

TABLE IV

Observer W. Unit, 1/50 sec.

	Affective discrimination times						Sensible discrimination times					
Stimulus	Range	Median	MV	Average	MV	Wrong	Range	Median	MV	Average	MV	Wrong
Hard	44-60	48	4.3	48	5.1	2	30-44	36	4.0	38	4.6	1
Soft	48-66	58	4.8	59	5.3	6	28-38	34	2.0	34	2.0	5
Rough	26-50	46	5.6	43	6.6	5	28-44	32	3.5	34	3.5	4
Smooth	32-48	44	3.2	42	4.4	4	22-34	30	1.8	31	2.0	3
Sharp	34-50	38	5.5	40	5.0	6	26-34	29	2.7	30	3.0	6
Blunt	38-60	42	8.1	49	7.0	2	34-48	38	4.5	41	4.5	2
Wet	36-54	46	6.1	47	6.1	3	30-46	38	4.0	39	4.2	2
Dry	38-60	46	4.8	44	5.0	4	30-46	44	6.6	39	7.6	4
Warm	42-69	54	9.0	55	9.4	2	38-60	50	7.0	49	6.4	4
Cold	42-62	58	8.8	59	9.2	2	40-44	42	2.1	43	2.1	2

TABLE V

Observer C. Unit, 1/50 sec.

	Affective discrimination times						Sensible discrimination times					
Stimulus	Range	Median	MV	Average	MV	Wrong	Range	Median	MV	Average	MV	Wrong
Hard	84-130	99	15.0	108	12.7	3	40-70	54	6.7	55	6.8	1
Soft	54-108	82	22.0	85	17.4	3	46-66	58	5.0	56	5.1	2
Rough	66-150	84	28.0	106	21.3	3	58-90	68	9.4	69	9.0	5
Smooth	86-102	81	6.4	89	4.0	2	58-66	60	2.3	62	2.6	2
Sharp	58-114	76	15.0	80	15.0	2	32-54	50	5.6	46	6.0	4
Blunt	54-106	84	28.8	103	28.4	4	48-72	60	7.0	60	7.0	3
Wet	66-98	80	9.9	81	11.2	2	52-74	62	6.9	60	7.4	2
Dry	98-148	90	9.1	94	9.5	4	46-60	52	4.0	54	3.6	2
Warm	84-108	89	9.8	88	9.0	3	74-94	81	4.8	84	4.5	2
Cold	82-152	84	18.0	103	18.6	1	62-90	79	7.7	77	8.3	2

The general results are the same as those of Tables I and II. In all three Tables, however, there are many more 'wrong' reactions than we obtained with G and P; it must be remembered that these two observers had had prolonged special practice in work upon the affective processes, while R, W and C were new both to the problem and to the particular method of reaction. It is striking that the absolute times given by C obviously fall into the same class as those of G and P, while the times given by the two woman-observers R and W are, throughout, shorter. Thus, if we average the averages, for the sake of a rough comparison, we find:

	Sensory	Affective
G	56.8	73.5
P	62.2	78.9
C	62.3	93.7
R	35.3	40.2
W	37.8	52.2

There was no difference, that we could discover, in the nature of the 'wrong' reactions as given by C on the one hand and R and W on the other; practically all of these reactions were due to the observer's omission to move his finger down upon the stimulus, or to his making the touch upon the stimulus surface so light that the pendulum was not released. The sole point of difference that we could find was this: that C took the difficulties of manipulation easily and in a matter of course way, whereas R and W were a little afraid of the apparatus, and braced themselves anxiously for its management. It is possible, then, that they hurried over the reaction, and made it cognitive rather than discriminative. The time required for the cognition of a color is, for instance, considerably less than that required for the discrimination of two colors (Wundt, *Phys. Psych.*, iii, 1903, 456, 458). If this interpretation is correct, we have shown, though unintentionally, that the cognitive as well as the discriminative reaction may be applied to the affective processes. We had required no introspections during the course of the experiments; the observers were simply asked to follow to the best of their ability the instructions given. When questioned at the end of the work, however, and when confronted with a careful analysis of the cognitive and the discriminative attitudes, R and W inclined to the view that they had, in fact, reacted cognitively. At all events, the important thing is that the affective averages are without exception the larger.

The stimuli *hard* and *dry*, which in the sensible discriminations were contrasted with *soft* and *wet* were apprehended by all observers in the affective discriminations as *smooth*. Since this change in apprehension destroyed the parallelism of the two halves of our Tables, we made some additional experiments (21 valid reactions with P and G, and 18 with R, W and C) in which these stimuli were contrasted with a *rough*. The results are shown in the following Table.

DISCRIMINATIVE REACTIONS TO SMOOTH

Observer	Stimulus	Range	Median	MV	Average	MV
G	Hard	52-64	60	4.7	59	5.4
	Dry	50-64	58	4.2	60	4.8
P	Hard	44-54	50	4.1	47	4.9
	Dry	46-58	50	4.8	51	6.2
R	Hard	32-40	36	2.8	37	2.8
	Dry	35-44	38	1.7	39	2.8
W	Hard	41-56	45	4.3	46	4.0
	Dry	36-52	44	5.0	43	5.0
C	Hard	57-71	65	3.1	63	3.0
	Dry	55-71	62	3.1	60	2.5

If we compare these times, first, with the times for *smooth* in the preceding Tables, we observe that G and P show a slight shortening, presumably due to practice; R and C give practically the same values as before; W gives a somewhat longer reaction, due (in her own belief) to the persistence of the connection between 'smooth' and the kid-leather feeling of the earlier series. If, secondly, we substitute them in the previous Tables for the sensible discrimination times under the headings *hard* and *dry*, we find that the difference between the two types of reaction is somewhat lessened for *hard* in the cases of G, W and C, lessened to 0 in the case of R, and somewhat increased in the case of P; while the difference for *dry* is somewhat lessened in the cases of R and C, increased in that of P, and left unchanged in those of G and W. It is, of course, entirely possible that affective reactions, had they been introduced into this supplementary series, would again have given uniformly longer times.

On the general question of the time-relations of sensory and affective arousal, two opinions are *a priori* possible. Since feeling is readily and regularly 'expressed' in movement, it might be maintained that the movement which registers the appearance of an affective process in consciousness should occur at least as quickly as that which indicates the appearance of a sensation. Since, on the other hand, affection lacks the attribute of clearness, it might be maintained that a longer time must elapse than in the case of sensation before the movement of response is made. The experiments performed in the Harvard laboratory tell directly, those just described tell indirectly, for the second hypothesis. Or at any rate they show that, whether the reaction movement itself be performed more quickly or more slowly, the formation of an affective consciousness requires a longer time than that of a sensory consciousness.

A full discussion of the question would here, where we are dealing only with indirect evidence, be out of place; it will be given in a later paper. What we have proved in the present Section is that the method of reaction is applicable to the affective processes pleasantness and unpleasantness. The affective discrimination times are, as we have said, times of the same general order, and show the same sort of variability, as the sensible discrimination times. It remains only to add that there was no single case, in the reaction experiments, when the affection appeared first in consciousness, as the herald of the connected sensory quality (*cf.* pp. 181 f. above). Whenever the observer reacted to affection, he reacted to a pleasant or unpleasant cutaneous perception.

ON THE ANALYSIS OF AUDITORY MEMORY CONSCIOUSNESS[1]

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[1]The work on this study was done at Clark University during the academic year and summer of 1906-07. The experiment as originally planned not being completed, the report of the results has been postponed in the hope of carrying out the experiment as at first intended. Change of circumstances, however, has led me to take up other investigations and I offer the results now as they stand. I wish to express my indebtedness to the Clark University authorities for supplying the rather expensive special apparatus required and for the liberal opportunity given to carry out the work, and to my observers,—Dr. W. F. Book, Dr. H. L. Brittain, Dr. W. L. Guard, Dr. J. Morse, Dr. G. Ordahl, and Dr. J. H. White,— for their careful and expert work.

I. Introduction.

A. *Aim of Study.* The general aim of this study has been the same as in preceding ones on the analysis of visual memory.[1] This is to determine the conscious processes that enter in memorizing and in recalling given sensory material, together with the description of their character and function. It has been discussed sufficiently in the former studies and will not be considered further here. In the analysis of auditory memory, however, a special difficulty is met in determining the detailed character of the auditory imagery and the changes it undergoes with the lapse of time and other conditions. This is the difficulty of describing a sound, or its auditory image. Drawings and verbal description may quite accurately portray size, shape and color in visual memory, but there is no correspondingly adequate means of describing in detail the durations, rhythms, and variations in pitch and intensity of even a very simple sound. The present results on the nature of the auditory imagery and the changes it undergoes are therefore of a somewhat general character only. On the other hand, the method has been quite adequate for determining the presence, nature and function of the non-auditory processes in learning and in recalling the auditory material. Our main effort will be directed to the description of these.

B. *Method and Procedure.* It was desired to study auditory memory under conditions that approached as nearly as possible those of every-day experience. This required means of reproducing at will verbal discourse and the sounds of more or less familiar things in their true character. The graphophone method was finally chosen as the most satisfactory.

The experiment falls into two parts. The material for the first part consisted of verbal discourse; for the second part groups of sounds of familiar things were used. For the verbal discourse five descriptive records were so chosen as to range from a simple monologue to quite complex scenes in which several persons are heard.[2] For the second part of the experiment two groups of seven sounds each were made up. These were cut out of Edison and Columbia cylinder records. The seven small rings containing the sounds wanted for a

[1] See "On the Analysis of the Memory Consciousness: A Study in the Mental Imagery and Memory of Meaningless Visual Forms". *Psych. Rev.*, 1906, and "On the Analysis of the Memory Consciousness for Pictures of Familiar Objects." *Am. Jour. Psy.*, 1907.

[2] The following are the records that were used for the verbal discourse: Edison records: 1. McKinley's address at the St. Louis Exposition. 2. Waiting for the Dinner Horn to Blow. 3. Closing Time at a Country Grocery. 4. Two Rubes and the Tramp Fiddler. 5. Louis and Lena at Luna Park.

group were then stuck together again, making a new cylinder record.[1] A scale graded to a hundredth of an inch was fastened to the front part of an Edison machine. A pointer and magnifying lens fastened to the reproducer arm travelled in front of the scale. With this arrangement a little practice was sufficient to enable the experimenter to drop and raise the reproducer so as to pick from each ring just the sound that was wanted and no more, while the observer listened to the group. The substitution of a high grade alternating current motor for the spring motor of the machine, and special ear tubes with sound modulating attachment and means of regulating the intensity completed the equipment for presenting the auditory material.

For the verbal discourse the procedure was as follows. A descriptive record was heard two to three times at the first sitting and not again later. It was recalled four times with full introspective description of the process. The first recall was immediately after hearing, the second to fourth with one, three, and six weeks intervals, respectively, between two successive recalls. Three observers participated. With the groups of familiar sounds three series of experiments were made. In the first series the sounds were heard twice in immediate succession with immediate recall. It was found that two presentations were just sufficient to induce the recall of all, without hesitation, immediately after hearing. Four weeks afterwards the character of the sounds had been entirely forgotten. The second series was then taken with the same sounds and the same three observers, in the same manner as in the first series, excepting that the sounds were now presented three times in immediate succession. In the fourth series three new observers heard the same sounds four times in immediate succession, the procedure being otherwise as before.[2]

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[1]Group I consisted of the following sounds: 1. Ringing of a bell. 2. Song of an English Wren. 3. Snare Drum. 4. Crow of a bantam rooster. 5. Lowing of a cow. 6. Laughter. 7. Bugle call—taps. Group II consisted of: 1. Cheers of a crowd. 2. Bugle call—assembly. 3. Peep of a chick. 4. Steamboat whistle. 5. Call of a peacock. 6. Bellow of a calf. 7. Bark and snarl of a dog.

[2]This constitutes the series with the familiar sounds so far as their results will for the most part be reported at present. In the actual conduct of the experiment, however, three recalls were made in the first series, one immediately after hearing and the second and third with one and three weeks, respectively, between successive recalls. The sounds were not presented again after the first sitting. The second series followed immediately on the conclusion of the first, and the sounds were presented three times a sitting for four successive days, with recalls on the first and fifth days. In the third series the sounds were presented four times a sitting with two sittings a day, continued

The sounds of a group were always presented in the same order, with ten to fifteen seconds intervening between successive ones. The following was then required of the observer: (1) A general, semi-passive recall in which he was required merely to name the sounds and give the order of the different kinds of processes that entered. He was asked not to stop to recall anything further about them. (2) His observations on his manner of memorizing the sounds. (3) The recall of each sound, one at a time, as vividly and completely as possible, giving his observations on the order of the different processes entering and on their nature and function in detail. (4) Next he measured off by means of a noiseless switch key what he thonght was the duration of the sound, repeating the measurement three times in immediate succession,[1] and gave his observations on the mental processes in this measurement of the duration. (5) After the conclusion of a series with a group of sounds, each observer measured the duration of each sound while listening to it, in order to determine its actual duration plus the observer's individual reaction time. The main attention and time was given to the third of the above requirements.

II. Analysis for Auditory Verbal Discourse.

A. *Factors in the Recall.* I shall consider first the manner in which the words and other sounds heard in the descriptive records were recalled. There were three distinct ways in which this was done. First, the auditory imagery of the words appeared at once without any process preceding as an aid to its recall. Second, concrete visual imagery of the persons and things appeared first as a means of recalling the words. Third, the words were inferred from the context as already recalled. The first way needs no further description.

1. Character and use of the Visual Imagery. While the observer listened to a record he visualized the persons and scene

for four days. The recalls followed immediately after the first sitting of the first day, and preceded immediately the presentation in the first sitting on the following days. The object of the repeated recalls in the first series was the same as in the repeated recalls for the verbal discourse to be described below. The object of the repeated presentation in the second and third series was to determine what changes would thus be brought about in the manner of learning and of recall. As regards the recall, the effect of the lapse of time and of the repetitions of the presentation was not enough to be conclusive. All the figures and tables given in the present report are taken from results of the immediate recalls of the first sittings only. But the introspections of the observers for the later sittings are also taken into account.

[1]The key was set in circuit with an ordinary stop-watch and electromagnet whose attached lever started and stopped the watch as the key was turned in and out.

suggested in much profusion and detail. The details of dress and appearance of persons, their movements, facial expressions, and their surroundings were sometimes visualized in a manner so complete as to seem to leave out but little that would have been supplied if all had been actually present and seen as well as heard. This visual imagery played a very significant part in the recall of the words and other sounds heard. It frequently appeared simultaneously with or followed the auditory imagery, but it was difficult to determine its function in such cases. We shall consider it mainly only so far as it preceded the auditory imagery.

In all but the immediate recalls of a record the first thing that came to mind was as a rule visual imagery. The general setting was visualized, including the persons and the things suggested, their relative positions, and the arrangement of the general surroundings. Sometimes these would be reviewed in much detail so that a remarkably minute description of the appearance of persons and things could be given from this visual imagery. The clue to the recall of the words was sought in it, while all auditory imagery might remain absent for several minutes. With the recall of the first phrase or sentence this visual imagery dropped out for the most part. A very vague and incomplete visual sketch of the scene might remain in the background of consciousness, with a clearer focus that was immediately connected with the words that were being recalled standing out in detail. But more usually the former was entirely absent after some words were once recalled, and was returned to only when the recall became difficult. Degree of difficulty of recall of the words largely determined the nature and use made of the visual imagery throughout. If very easy, the visual imagery tended to drop out entirely, or, if present in this case, accompanied the auditory imagery simultaneously rather than preceded it. Besides degree of difficulty of recall, the nature of the record determined the presence and manner of use of the visual imagery. Naturally, the verbal discourse suggested visual imagery in different degrees, according to its nature. This difference appeared in the recall. This general manner of behavior of the visual imagery gave to it, when taken by itself, various degrees of continuity, both with reference to its temporal succession and with reference to its representing a connected scene or event.

Besides being an aid to the recall of the auditory imagery of the words, it filled in the gaps left by words that could not be recalled at all. Where the words were entirely forgotten the visual imagery present often supplied the meaning. The actions of the persons speaking, the facial expressions as visualized indicated what they were saying, especially what replies

were given to specific questions for which the words had already been recalled in auditory terms. But this filling in with visual imagery where words could not be recalled occurred even when no meaning was supplied with it. Such was the case when a person was visualized as finishing a sentence, or replying to a question, the observer seeing the lips move and the gestures in this visual picture, without any knowledge of the content of the forgotten words. Usually the observer would know fairly definitely the length of the forgotten remarks, but no more, from this visual imagery. This function of filling in the gaps so as to make a continuous and connected account of what was recalled came particularly to the fore when the recall of the words was very fragmentary so as to become confused and the order of remarks lost. In such cases the visual imagery was used to straighten out this confusion and to determine where each remark and phrase belonged.

2. Inference from the Context. I call the observer's determination of what the words were from what was already recalled an inference from the context. This process was peculiarly prominent. The nature of the introspective reports indicates that the observers were often not aware that this was the procedure, instead of real recall. But special questioning at such points usually revealed the true process. A definite quantitative statement cannot be made from the present data. But they justify attributing about a fourth, on the whole, of what was reported as recalled to this sort of inference. The descriptive records that were used were favorable to inference as a means of recall. Since all but one presented conversations between two or more persons, questions and answers were both readily inferred when either had been definitely recalled. This was often equally true of any preceding remark when the following one was already known. These inferences were made in two ways. (a) They were made from words that had been recalled, from the verbal context. (b) From the visual imagery. The first needs no further description. The second was apparently the more prominent. The remarks made were inferred from the actions, attitudes, expressions of the persons speaking, as visualized. Obviously, when this visual imagery was quite complete and connected, this could be done readily and correctly. That it might play a large rôle will become clearer after a description of the character of the auditory imagery and the changes which both visual and auditory imagery underwent with the lapse of time.

B. *Character of the Auditory Imagery.* The character of the auditory imagery presented three different aspects: (1) It varied with reference to the completeness with which a sentence was recalled directly in auditory terms. (2) It varied with

reference to the degree in which the words were imaged in the quality of the individual voice. (3) Imagery of the voice in its true character sometimes appeared without the recall of any words.

1. Degrees of Completeness. It might have been supposed that the sentence, or part of it that independently suggested meaning, would always have been the unit of recall. This was not the case. The different remarks that had been heard were recalled in fragments much oftener than as a whole. The auditory imagery of certain words or phrases would flash out first, often remaining isolated from any further recall or any meaning for some time. With this for a start, the remainder would be filled in until the sentence was completed and recognized as correct in meaning and in words. A single sentence therefore frequently embodied all the different ways of recall, direct recall in terms of auditory imagery, the auditory imagery brought in associatively by preceding concrete visual imagery, or brought in by inference from the verbal or visual context. The amount recalled directly in terms of auditory imagery varied from the entire absence of the latter to the recall of all the words in this direct way.

2. Differences in Quality. The auditory imagery for the words recalled was of several different forms. (a) In some cases the words would ring out clear and intense, minutely in the character of the individual voice in which they had been heard. The imagery then approached the perceptive quality characteristic of all vivid recall. (b) As frequently the individual character of the voice was entirely absent in the imagery. The words would still be imaged distinctly, but in a sort of characterless form, resembling the voice of one no more than of the other person heard. Between these two forms all grades naturally appeared. As was the case with most of the records used, two of the voices in each contrasted quite strongly as bass and tenor. Perhaps the most frequent form of the auditory imagery was that in which the bass or tenor was still recognized, but not the particular bass or tenor concerned. (c) A third class of words is to be added; words that were reported as recalled without first clearly imaging them. The process here was similar to that of ordinary conversation, when sentences are formed without any definite auditory imagery preceding the spoken words.

The manner of recall was characteristic of these forms of auditory imagery. The first was usually recalled directly, sometimes suggested by preceding visual imagery, but never the result of inference from the context. The second was largely recalled directly, about as frequently suggested by concrete visual imagery, and in some cases preceded by infer-

ence. The third was solely a product of inference from the context.

From both the form of the imagery and the manner of its recall it might be expected that certainty as to correctness would be greatest for the first and least for the last. In the main this was the case, but with very frequent exceptions belonging to the second class. Words that were distinctly imaged in auditory terms, but without the individual character of the voice in which they had been heard were very often regarded as correct with as great certainty as were those of the first class.

3. Imagery of the Voice without Recall of the Words. An interesting phase of the auditory imagery appeared when in the recall of a sentence the voice was heard to continue beyond the point where the words were recalled. This was not an occasional occurrence, but rather the rule for sentences that were recalled in a fragmentary fashion. The nature of this imagery was by some of the observers compared with hearing voices at a distance, which may be recognized as the voices of certain friends, without being able to understand what is being said. In the case of this auditory imagery the individual character of the particular voice was quite often very clearly recognized. In it was also reproduced the accents and rhythms, so that the number of words that could not be recalled could sometimes be accurately stated. Undoubtedly this imagery was some aid to the recall of the missing words when these were later recalled, but there were numerous instances in which the middle phrase or so of a sentence was auditorily imaged with the beginning and end filled in with this auditory imagery of the voice quality alone as the final result. The latter might be accompanied by visual imagery of the person, moving lips, facial expression, etc., from which something of the meaning might be gleaned.

C. *Changes with the Lapse of Time.* It will be remembered that there were four recalls for each record, and that the time intervals between successive recalls were one, three and six weeks, respectively, the first being immediately after hearing a record. For these intervals the greatest changes occurred between the immediate and the second recall; and contrasting the first with the last recall showed in every case a peculiarly striking transformation in both the manner of recall and in the final result, the auditory imagery of the words. We may consider first the changes in the total process, the factors entering to produce the auditory imagery.

1. Changes in the Visual Imagery. We have to deal with changes in the amount and detail of the visual imagery, in its temporal continuity and associative connectedness, in its func-

tion, and in its clearness and vivacity. This will be done mostly by contrasting the immediate recall with the last two. In the immediate recall the visual imagery was not constantly present. It came in at special points, which were at the beginning, or where the words suggested changes in the scene or action, or where the recall was more difficult. It was therefore incomplete and disconnected as regards the action or event it represented. It also very largely accompanied the auditory imagery simultaneously rather than preceded it as a means to its recall. It might seem to have been largely superfluous at this stage. With this incompleteness went at the same time minute detail of another sort. This was of the persons heard in the record, of their dress, personal appearance and action. A large portion of this had apparently no connection whatsoever with what had been heard, but was merely the result of the tendency to complete a visual picture. It could therefore be of service in recall at any time only indirectly, by bringing up those other details of the visual imagery that had been directly suggested by the words. The first and prominent change with the lapse of time was in the manner of use of the visual imagery. Instead of accompanying the auditory imagery simultaneously it preceded it as a means to its recall. This change was greatest for the beginning of the recall of a record. In the second recall already, after a week's interval, the visual imagery representing the general scene and action was usually the first thing that appeared. Having once started the recall of the words, the visual imagery might recede again, much as in the immediate recall. For the last recalls this change in function was evident throughout the recall of a record. The visual imagery preceded the auditory in most cases. Other changes were connected with this change in function. In the first place, there was more visual imagery of the sort directly connected with the recall of words. It was at first absent in some places where the words might have suggested it, and it appeared at such places later. In the second place, it was temporarily more continuous and associatively more connected, both being largely the result of the new imagery appearing where it was at first absent. Thus, in the extreme cases, the visual imagery taken by itself represented the whole scene and action suggested by the words, developed in the right order and in a continuous manner. It supplied the whole framework for the meaning of the words.

The new visual imagery that appeared during the later recalls was used as a means to recall words. The unessential visual details, details that had not been directly suggested by the words, did not show the same tendency to change. On the whole, it seems to have been somewhat on the decrease.

The observations were to the effect that some of the unessential details had dropped out, while at the same time the descriptions of the ways in which the persons and things suggested were visualized were, when the observer was asked to describe his visual imagery, often as detailed in the last recalls as in the first.

The visual imagery that was used in the later recalls as a means to recall did not show any decrease in general clearness, but was reported as remaining the same; or, in a few cases, as having increased in clearness. Considering the conditions, this, indeed, was to be expected. Since it had not had its origin in visual perception and was repeated at intervals, there was no occasion for its losing in clearness.

2. Changes in the Auditory Imagery. The changes in the auditory imagery with the lapse of time may be inferred largely from the preceding description of its character, and from the changes in the character and function of the visual imagery. We may follow the course already outlined and consider changes in degrees of completeness, and changes in quality. Naturally, the auditory imagery was most complete, the sentences were recalled in less fragmentary fashion, in the immediate recalls. But several additional observations are to be noted. The later recalls were characterized more by whole sentences being left out rather than by certain phrases or words only of a sentence being recalled. Thus the fragmentary character of the sentences that were recalled did not change so much with time. But the meagreness of this direct recall in terms of auditory imagery when compared with the visual imagery present was always very striking after the six weeks interval. A sentence or two was sometimes all that was imaged in auditory terms without being derived from the visual imagery. Further, the fragments consisting of a few words or a phrase only in the immediate recall were often not completed at all, the meaning being lost. But in the later recalls such fragments recalled in auditory terms were more usually parts of sentences that were filled out in other ways, the words only and not the meaning also being forgotten.

The change of the auditory imagery to a form in which the individual peculiarity of the voice heard is absent is one that has been observed in the recall of nonsense syllables. It is the main change in quality to be noted here. The change for connected verbal discourse, however, seems to be more marked, probably because this individual character of the voice is in this case more vividly imaged at the beginning than it is for nonsense syllables. In the second place, the change occurred much more slowly. Even in the third recall the

voices were sometimes still imaged in their individual character, so far as the observers could judge. We may also note several stages in this change. This will make the complete statement of the forms of the auditory imagery and the order in which the changes from one to the other occurred as follows: (a) The voice is imaged in its individual quality. (b) The voice is imaged as bass or tenor, but without any particular individual characteristic. (c) The voice is imaged in a somewhat characterless fashion. (d) No complete imagery of the voice at all, the sentences being formulated as is usually the case in ordinary conversation.[1]

III. Analysis for Groups of Sounds

Any one who has had his attention called to the matter will have observed the very striking difference in the amount and nature of associated imagery when he is looking at things when they are silent and when he is listening to the sounds they make when he cannot see them. The visual impressions of things have of themselves but a very slight tendency to arouse the memory of their sounds. But when we hear sounds we almost invariably visualize the things that produce them. In the previous study on the memory of pictures of familiar objects there was never the slightest tendency to auditory imagery while memorizing a group of pictures, and auditory imagery entered only in a very few individual instances in the recall of the pictures after long time intervals. How visual imagery enters when the sounds heard are human voices has been seen in detail above. In the second part of this study visual imagery was never entirely absent in listening to the sounds for the first few times, nor in the recalls immediately after hearing them. But this visual imagery does not constitute the only possible associated process that may be relatively absent or abundantly present in auditory perception. We have to deal always at least with vocalization and with other motor processes. This, if present at all in the memorizing and recall of verbal discourse, played such an insignificant part as to escape the observer's notice. But in the case of the groups of sounds both the process of memorizing and of recall was more complex. A brief description of the factors present in memorizing the sounds will throw some light on the analysis of their recall.

A. *Methods of Memorizing the Sounds.* The nature of the

[1]For the third form one observer noted that the words were imaged somewhat in the character of his own voice. This suggests that vocalization was probably also a factor in the recall in this case. But whatever part vocalization may have played, it was of such an incipient character as to escape observation.

series of experiments taken in this second part will be remembered from the description already given (pp. 195 ff. above). The methods of memorizing a group of sounds were different in the first series from what they were in the second and third. In the first series the small number of repetitions permitted little more than learning the group as a whole. Only a minor share of the attention could be directed to memorizing the details of individual sounds, if none were to be forgotten altogether. In this matter the observers all followed the plan used by those memorizing visual material. Details were attended to only after the recall as a whole was insured. Associated processes entered at once. For all the sounds that were interpreted at all the visual image of the thing was at once aroused on hearing the sound. While the sound lasted the attention was then divided between the auditory perception and the visual image. In the first repetition of a group immediately after the first hearing an incipient naming of the things, or an incipient imitation of the sound might accompany the hearing. By the third or fourth hearing imitation always entered. The ten to fifteen seconds intervals between successive sounds were used for the recall of what had just been heard. In this recall attention usually went to the names in an attempt to commit to memory the series of names for the group. With the recall of the name, the visual image usually came in of its own accord, while the auditory image entered less readily.

In the second and third series the larger number of repetitions of the presentations made attention to memorizing details possible. The general procedure of the observer changed. The first change was the frequent absence of the visual image while the sound was being heard. In the second place, imitation of the sound, while listening, increased. In the recall during the intervals between successive sounds the visual image was very readily eliminated, and the name disappeared with equal ease. The prominence of auditory imagery increased correspondingly.[1]

B. *The Factors in Recall.* 1. Associative Connections Between Sounds. Associative connections between two or more sounds were in the present case almost entirely absent, though such connections were very prominent in the memory for pictures of familiar objects. Only one form appeared. This consisted of a classification, two or three sounds being put into a class and fixed by a verbal class description. Such associative connections, however, as a means of recalling any of the sounds as

[1]These changes in the manner of memorizing became quite marked in the later sittings of the second and third series where the sounds were heard repeatedly on successive days.

wholes played a very insignificant part. Their function need not be considered further. But before comparisons are made two special reasons for their absence here must be noted. The first lies in the small number of sounds in a group. Such associative connecting was not so imperatively required in order to insure the recall of all. The second lies in the fact that the sounds were presented successively, while the pictures were presented simultaneously. Associative connections between the individual members of a group of stimuli doubtless always suggest themselves more readily when the stimuli are presented simultaneously.

2. The Order of Appearance of the Different Processes. The processes with which we are concerned here are: (a) the auditory imagery, the recall of which is the purpose of the whole; (b) the visual imagery of the things that the sounds suggest; (c) the verbal imagery of the names; (d) the motor processes involved in vocally imitating the sounds and in following out the rhythms with hands, head, and other parts. The function of these factors in the total recall process may be measured in part by the order in which they appear in that total process. This order will give an idea of their relative spontaneity, and hence of the relative ease with which they can serve the function of suggesting auditory imagery. In this only the results of the general, semi-passive recall will be taken into account. When the effort is made to recall the sounds as completely and vividly as possible the order and function of the several processes is quite different. This will be seen later. The following table gives the percentages of the number of times each process held each of the four places, or was absent entirely.

	I[1]				
	1st	2d	3d	4th	Absent
Visual	53	25	15	1	10
Auditory	35	39	29	6	3
Verbal	15	15	0	55	18
Motor	8	22	18	10	44

In taking these figures as an indication or the relative spontaneity of the several processes we must take into account the necessity of using the names of the things for the purpose of describing the process of recall. This brought in the verbal process for the fourth place when otherwise it would probably

[1] In those cases in which two processes were reported as having appeared simultaneously each was counted once for that place. This makes the percentages sum to a little more than a hundred for each process, except for the verbal the observation on which was sometimes overlooked.

have been absent in these 55% of the cases. The 18% in which it was absent include the cases in which the observer did not interpret the sound and therefore had no name for it. Aside from this, we see that half the time visual imagery is the first thing in recall, that the auditory imagery is distributed fairly equally over first, second, and third place, that the verbal process comes in either early or last, and that the motor process is most frequent in the middle of the total recall process. It will be remembered that in the recall during the memorizing of a group of sounds more effort was made to recall the names than for any of the other processes. Its relative lack in prominence here is significant as showing how readily a process can serve the function of fixing associated imagery so as to insure its recall and then itself drop out of the recall later.

This comparison of the relative spontaneity of the several processes gives only a rough idea of the relative part each played directly in leading up to the auditory imagery, since each might follow as well as precede the latter. This function of each is seen better in a direct comparison of the relative frequency with which each preceded and followed. The next table gives this comparison in percentages.

II

	Preceded	Followed
Visual	55	35
Verbal	24	58
Motor	13	43

It is understood, of course, that these several processes, visual, verbal, and motor might accompany the auditory imagery, simultaneously, or might remain absent altogether in this general, semi-passive recall, and also that any two or all three might in the individual case precede the auditory imagery.

Since in this part of the experiment the object was merely to determine the relative spontaneity of the different factors in the total recall process, no effort was made to get observations on the nature and degree of completeness of the auditory imagery. But it was evident that as a rule only a very small part of the total auditory imagery for a sound was aroused in this way, while the 43% of the cases in which motor processes of imitation followed auditory imagery is evidence that the process of recall did not always stop where it was intended it should. For, as we shall see later, the use of motor processes was the predominant means of recalling details. We may proceed now to a description of the character of these several factors in the recall, and the manner in which they were used to produce

auditory imagery. We shall here consider both the semi-passive recall and the recall of the details of the sounds. In this recall of details the relative usefulness of the several factors is entirely changed.

3. Character of the Visual Imagery and Nature of its Function. From the standpoint of its function, the visual imagery that entered the recall of the sounds follows three types: (a) The visual image of the thing that produced the sound, which is used for the purpose merely of getting the auditory imagery as a whole or for starting the auditory process. (b) The visual image of the thing going through the motions it would make in producing the sound in question. In addition to being used in the same way as the first, it sometimes served the purpose of recalling the details of the sounds. (c) Visual sound analogues, used mainly for the recall of details of the sounds. The first class and its manner of use was by far the most frequent, so that in the semi-passive recall visual imagery was very prominent as an aid to recall, while in the recall of details it was quite infrequently an aid.

(a) The visual image of the thing tended to take on special characteristics that were suggested by special characteristics of the sound. In individual instances this was carried out to quite minute details. But frequently a visual image with such special characteristics to fit the sound in detail could not be found, or at least did not suggest itself spontaneously. In these latter instances what did suggest itself was not ruled out because of its shortcomings. It appeared as a means of recalling the auditory imagery as a whole although the discrepancy between the thing visualized and the sound with which it was associated forced itself vividly upon consciousness. A tendency exactly opposite to that of visualizing in detail was the appearance of only the essential parts of the thing in the visual imagery, the parts that immediately produced the sound or from which it was emitted. Possibly another form of this tendency was given in some cases in which it consisted merely of some sort of visual consciousness of the direction and distance from which the sound was regarded as coming. With the first suggestion of a part of the auditory imagery the visual imagery of this class at once dropped out. It sometimes appeared a number of times again before the auditory process was completed, but in such cases it came in entirely of itself and was of no service. If the observer tried voluntarily to recall it again and hold it, it interfered with the auditory imagery. Usually the latter dropped out at once when the viual imagery was thus attended to.

(b) For the second and third classes of visual imagery the behavior of the auditory imagery when the former was thus

attended to was sometimes quite different. In some cases in which the object was visualized as going through the motions required in making the sound such visualization was an aid to the recall of the details of the sound. These cases were, however, not frequent even when considering only those instances in which they were quite possible. The observer also sometimes stated that its presence seemed to be of no aid to the recall; it merely accompanied the auditory imagery. The possibility of its being used in the recall of the details followed from the fact that in these cases the visual and auditory processes constituted two closely parallel series of changes. A change in position of the moving part was closely associated with a change in the character of the sound. That the visualization of these motions did not always play a part in the recall of details is very likely accounted for by its influence being outweighed by the distraction introduced in turning the attention to disparate imagery.

(c) The visual sound analogues came in less frequently to start the auditory imagery or to recall the sound as a whole, but when present were always used to recall details. Only three of the six observers reported them, but with two of these they were very common, some form being made use of in most cases. These analogues consisted, in the first place, of the visualization of some arbitrary form, marked off somewhat vaguely in the general field of vision by differences in brightness, in a few individual cases colors being introduced. The majority of these forms were cylindrical or eliptical in shape. Others consisted of coils, wavy lines, irregular patches. In addition to their general shape they possessed within further details of form in varying degrees. Likewise, while a difference in brightness marked them off in the general visual field, further differences in brightness and color marked off different parts or areas within them. Finally, either the form as a whole alone, or parts within, were visualized as in motion, or, what corresponded to such motion, the form was visualized as developing from one end to the other. Every detail in form, brightness, color, and motion, was patterned as an analogue to some characteristic in the sound. The two were associated so closely as often to seem to the observer like one process. The details of the auditory imagery were superimposed, so to speak, on the details of the visual, the two developing absolutely simultaneously. The auditory imagery, as one observer put it, was *visual*-auditory. In this way duration, rhythm, intensity, and pitch, were put into visual terms. The auditory part was never present without the visual analogue, but the latter often appeared without the auditory associate. In the latter case much could still be said about the nature of the

sound, and its duration could be indicated quite as accurately as when the auditory imagery was present also. These visual analogues usually appeared without any effort on the part of the observer to recall them. But when attention was directed to the recall of their details it never hindered, but always improved, the auditory imagery.

4. Use of the Verbal Process. Only the names of the things that produced the sounds, and never any verbal description of the details of the sounds themselves were employed. The former could, from the nature of the case, be useful only in recalling the sound as a whole. From the figures in the tables already given we saw that the recall of the name preceded the auditory image in 24% of the cases, and that in 55% of the cases it held last place in the total process. In this 24% of the cases the orders verbal-visual-auditory, visual-verbal-auditory, and verbal-auditory-visual occurred with about equal frequency. But the meagre data do not allow much generalization. For one observer the order was very strongly visual-verbal-auditory. For another the order verbal-auditory-visual was equally prominent. The nature of the verbal process with reference to the kind of imagery involved, gives some additional insight into the part it probably played in producing auditory imagery. When the verbal held fourth place it was nearly always a purely motor process. When the observer had completed the recall he simply found himself incipiently or actually pronouncing the name. There was no visual or auditory image of the name. On the other hand, when the verbal process preceded the auditory, and especially when it preceded also the visual, it was much more likely to include an auditory image of the name. At this point in the recall the observer was not concerned with description and the verbal process would not enter from this cause. There are left, however, some cases in which it followed reflexly the visual image that preceded the auditory.

5. Character of the Motor Processes and Nature of their Function. The motor processes were by far the most important of the several factors in the recall of the details of the sounds. As regards the muscles that came into use, they were of great variety. But we may divide them into two classes on the basis of their function and briefly describe, first, their general character, and then consider the manner of their use. These classes are: (a) motor processes involved in the vocal imitation of pitch and quality, and (b) various motor processes involved in the imitation of rhythm and duration. In the former the same set of muscles were necessarily always concerned, while imitation of rhythm occurred in the variety of ways familiar to every one.

(a) Naturally, the pitch and quality of the sounds could

not usually be accurately imitated. Very rough approximations only were the rule. Certain details of the sounds could be imitated. The rest would be 'slurred over.' This consisted mostly of a stationary tension in the vocal muscles with accompanying regulation of breathing. Sometimes another sound was substituted that was more easily imitated and which resembled the real sound. These substitutions were at times recognized as something familiar, and sometimes as constructions for the occasion. Imitating the sounds aloud was not permitted, but the vocalizing was nearly always much more than incipient. This was shown both by the direct observations and by laryngograph records that were taken on a few occasions. The care taken to imitate the sounds was apparently not greatly affected by the ease or difficulty met. Some vocalization of an imitative character entered in the recall when no sort of approximation even would seem to have been possible.

(b) Imitation of rhythm and duration was on the whole easier than imitation of pitch and quality. It was reported by the observer as considerably more prominent. For the irregular and difficult rhythms slurring over and substitution occurred in quite the same way as for pitch and quality. In like manner the very rough approximation to what was recognized as correct was followed out with as great care as the quite easy rhythms. One general and significant difference, however, is to be noted. In the imitation of rhythm there was a greater tendency to let details drop out, not because they were difficult, but because they were not needed for the purpose for which imitation of rhythm was used most. In this way imitation of the rhythm often became but little more than an indication of the duration of the sound. This consisted usually of a stationary tension in the muscles or of a single long-drawn-out movement equal in duration to the recognized duration of the whole sound. The regulation of the breathing in this way was especially prominent among these cases.

In describing the manner of use of both these classes of motor processes attention must be recalled to the distinction made between recalling the sound as a whole and recalling it in detail as vividly as possible. From the figures given on the order of the processes in the former kind of recall, it was seen that the motor processes preceded the auditory imagery in only 13% of the cases, while visual imagery preceded it in 55%. In the recall of the details of the sound this relation is entirely reversed. We have already seen how the visual imagery usually dropped out in the recall of details. But for *the motor processes in the recall of details* we may state at once as a general fact that they *were a constant and necessary means of producing auditory imagery of a sound in full.* The more they could be

introduced, the more detailed and vivid, the more satisfactory in general would be the auditory imagery. The process was decidedly a *motor*-auditory complex, in which the two factors were even more inseparably united than the visual sound analogue and the auditory imagery associated with it described before. According to the various observations at different times, the auditory imagery would fail to appear if the motor processes were voluntarily inhibited, or if attention was directed to getting the auditory imagery directly; the latter was dependent on the motor processes. To one observer the two seemed like one unitary process, his generalization on one occasion being that: "The vocalization almost *is* the sound. I cannot separate the two at all." Even for the observer who succeeded best in getting independent auditory imagery the latter could not be carried through vividly to its completion, but remained fragmentary and hazy without resorting to vocal imitation. As regards the difference in the function of the two classes of motor processes described, vocalization of pitch and quality and motor imitation of rhythm and duration, it is to be noted further that the two were not independent. While imitation of rhythm was perhaps no great aid to the recall of pitch and quality, the muscles involved in vocalization were often involved in marking off the rhythms and in judging the durations. In the recall of the duration of a sound the muscles used in following out the rhythms were the predominant factor. We may turn now to a special consideration of the recall of duration.

It will be remembered that each observer indicated the duration of a sound as he recalled it by turning a noiseless switch key, and that he also gave his observations on the mental processes involved in making this measurement. The latter will be taken up first. It was found at once that this measurement from memory was not at all a matter of measuring the duration of the auditory imagery. Five of the six observers could not even approach such a degree of control of the total auditory imagery as to make its total duration anything like what they regarded as the duration of the sound. They made the measurements mainly from the motor processes. The auditory imagery was, indeed, entirely absent about as frequently as any was present. In the majority of cases when it was present it was regarded either as of no use at all or as being only of slight aid in judging duration. The details with which the rhythm was followed out varied with the observers and with other conditions. The tendency to slur them over was often noted, so that the duration was judged largely from merely the stationary tension of the muscles, or long drawn out movement, as already noted.

From this analysis of the mental processes involved in measuring the duration from memory, it becomes more proper to speak of the accuracy of the associated motor processes in making this measurement than to speak of the accuracy of the auditory imagery. The next table gives a fair idea of how serviceable these motor processes were for this purpose. It gives the averages for the six observers of the measurements in seconds, of the actual sounds while they listened to them, and for their percentage of error in measuring them from memory.

III

Order of sounds in a group,	1	2	3	4	5	6	7
Duration as heard, Group I,	6.0	7.8	4.1	2.0	2.1	2.2	21.1
Percentage of error in recall,	21	41	33	33	77	17	63
Duration as heard, Group II,	3.4	4.6	1.3	5.4	1.8	2.0	2.2
Percentage of error in recall,	50	50	24	41	35	15	8

The general average error from these figures is 36. That is, these observers in measuring the duration of these sounds from memory during the hour in which they had heard them made an average error of 36%. They were underestimated more frequently than overestimated. Disregarding many exceptions we may state it as a rule that the short sounds were usually overestimated, while the long were always underestimated. The slowness of the motor processes in imitating seemed to be responsible for the overestimation of sounds of less than two seconds duration. Substitutions of other sounds and their imitation for the original doubtless caused overestimation in other cases. The tendency to gravitate towards an average length, a law found to hold true for the intensities of lights as recalled, was probably also present. But no adequate analysis of the causes of these errors in the measurement of duration of the sounds can be made from the present data. The variation in the amount of error from observer to observer, and from sound to sound was very great indicating a high degree of complexity of factors. The main result that is of significance for our present purpose is the fact that the auditory imagery was found to be so much less efficient than the motor processes in estimating the duration from memory, and that with the latter such large errors were still made.

C. *Character of the Auditory Imagery.* The foregoing analysis of the recall process, of the aids to reinstating the auditory imagery, the character and manner of their use, brings us to the description of the auditory imagery itself. Here we meet again the difficulty noted at the outset: there is no adequate means of describing auditory imagery. A few general characteristics of the auditory imagery were determined from the direct observations, and some further inferences

from the observations are evident. Our description will be limited to these.

1. Incompleteness. The characteristic most striking to all observers was incompleteness. What was present in auditory terms seemed to represent only a small part of the sound. If we combine this direct observation with measurements from memory of the sounds we see that the auditory imagery must often have been exceedingly fragmentary. These measurements of the duration were sometimes over 50% too short, but the auditory imagery took up only a small part of this measured duration. Indeed, direct observation in many special cases shows well enough this fragmentary character. We have, first of all, those instances in which the visual analogues or the motor processes were gone through in detail with no auditory imagery present whatsover. In some of these cases the observer was still able to measure the sound from memory with some fair degree of satisfaction to himself. Statements that only a trace of the auditory imagery, a bare suggestion of it, a mere 'flash', etc., could be obtained were very common. Its presence in such a degree of completeness as to seem to represent approximately all the details of a sound was very exceptional. The rule was that only a fraction of the sound, a fourth to a half, seemed to be imaged in auditory terms.

2. Its Course and Voluntary Control. Second in importance were certain characteristics concerning the course and voluntary control of the auditory imagery. A comparison of visual imagery of forms in these respects makes them the more striking. Its course was decidedly irregular. Certain parts only would come out, a note here and there, or larger part marked off more or less from the rest by its general character. These parts might be recognized as quite correct in quality, and were nearly always definitely placed in the total sound as being near the beginning, or end, or middle. The rest of the sound as remembered would then be represented by other than auditory processes. The means of its control has already been indicated. It was not direct, but through the aids to recall. In the effort to reinstate the auditory imagery in detail attention was not directed to that imagery itself directly, but to the motor processes of imitation, and to certain kinds of visual imagery in some cases. With attention thus directed the auditory imagery seemed to come in of itself if it appeared at all. When started or once obtained, it could not be held or developed by turning attention to it directly. It disappeared at once in spite of concentration, and the aids had again to be resorted to to make it return. As one observer put it, "Without the vocalization the auditory imagery does not run smoothly, the attention does not hold to it; it slips off and the

auditory image is gone." This means of control was employed for the different parts of the sound independently. Auditory details were repeated and modified to get them more correct by repeating and modifying more or less step by step the motor and visual processes for these details. Immediate repetition of the total recall decreased for the time being the ability to reinstate the auditory imagery. With such repetition it became vaguer, more incomplete, and required more attention to the aids to reinstate it. Apparently this is a fatigue effect not at all equally shared by visual imagery. Some auditory imagery sometimes came up more or less independently of motor or visual aids. This might be correct so far as it went, but sometimes it was recognized as wrong. In the latter case the observer often found that he could not control it so as to make it come up correctly. It consisted of short spotaneous 'flashes', belonging equally to easy and difficult sounds. These came in unexpectedly, when attention was not particularly directed to the recall of any detail, or just at the moment when the observer was relaxing his effort to recall. They disappeared at once and could never be reinstated by attempting to do so. The prominence of this kind of auditory imagery varied much with the different observers. For one a series of such flashes for a sound became the guide for directing and redirecting his motor processes by means of which he produced the auditory imagery in detail. Another observer, on the other hand, never reported such imagery.

3. Its Vividness and Quality. No direct measurement of the general vividness being possible, the observer was asked to compare the auditory imagery in this respect with his visual imagery of the things that entered. This comparison easily demonstrated a very great difference between the two classes of imagery. The observer whose auditory imagery was most prominent sometimes stated that it was as clear and vivid as his visual imagery of the associated things. But even for him such vividness was quite exceptional. For the other five the auditory imagery seldom even approximated the visual in vividness. This, indeed, becomes evident enough when we consider the general results given above, and compare them with our general observation on visual imagery.

As regards its general quality, the auditory imagery that was reinstated was of four different classes. These will need no special description. They were as follows. (a) Auditory imagery which included the characteristics peculiar to the given sound, and made it individual, instead of one of a class. For instance, the crow of the bantam rooster would be imaged in the distinctive way as heard, not as representative of the crow of any bantam rooster. (b) Auditory imagery represent-

ing largely only the class of sounds to which the one heard belonged. In these cases the observer was uncertain often as to whether the distinctive characteristics were imaged or not. Many of the substitutions for the original as heard belonged to this class. (c) Sounds considerably different from those heard were substituted, the observer being aware that his imagery represented a substitution, but accepting it as the nearest approximation he could make. (d) Some sort of auditory process which represented merely the general quality of the sound but included no detail or variations in pitch or intensity. This would distinguish the bugle from the whistle or from another musical instrument, for example. The usual statement of the observer in this case was that there was present a certain auditory quality that identified the kind of sound, but this mere quality did not materialize into a definite auditory image. With the exception of the third, as is seen, these are the same classes described for the auditory imagery in the recall of verbal discourse.

IV. Summary of Results

In the recall of verbal discourse the words were recalled (1) directly in terms of auditory imagery; (2) associatively through visual imagery of the persons and things that the heard words had suggested; (3) through inference from the visual or verbal context as already recalled. The second method of recall was by far the most prominent, and came especially into use at the beginning of the recall of a record, at turning points in the discourse, and at other points where for any reason the recall of the words was difficult.

The character of the auditory imagery varied with reference to (1) its completeness, (2) the degree in which the words were recalled in the quality of the individual voice; (3) imagery of the voice in its true character without the recall of any words sometimes occurred. As a rule only fragments of sentences and phrases were recalled directly in terms of auditory imagery, the rest being filled in by the other methods of recall. Sometimes the words were recalled in the quality of the individual's voice as heard. Usually this individual character was not represented in the auditory imagery while the latter was nevertheless distinct and clear. Sometimes the words were recalled without first definitely imaging them in a manner analogous to the process in ordinary conversation.

Changes with the lapse of time in both the manner of recall and in the nature of the factors entering were greatest from the immediate to the second recall, after a week's interval. Visual imagery, that at first accompanied simultaneously the auditory imagery of the words or followed it, later preceded it and became the means of recall. It increased in amount and

continuity, so that the visual imagery alone presented the whole scene and event. The general clearness and vivacity of the visual imagery remained about constant throughout the several recalls.

The total amount recalled in auditory terms decreased markedly, leaving sometimes only a sentence or two that was thus recalled after the six weeks' interval. But the fragmentary character of the sentence recalled at all did not increase much. The quality of the auditory imagery showed progressively the following stages of changes. (1) The voice was imaged in its individual quality. (2) It was imaged as bass or tenor merely. (3) It was imaged in a somewhat characterless fashion. (4) No definite complete auditory imagery at all appeared before the words were formulated and stated in the recall.

The processes entering in memorizing a group of sounds changed with the repeated presentations. During the first presentation attention was well divided between the actual sounds and the visual imagery they aroused. The first repetition or two next brought in the processes of naming the sounds and of vocally imitating them. With still further repetitions the visual imagery and the naming readily dropped out, the motor processes of imitation increased for a while, but tended also to drop out finally.

In recalling the sounds in a semi-passive way without any effort to recall them in detail or vividly, visual imagery appeared first in 53%, auditory imagery in 35%, the name in 15%, and motor processes in 8% of the cases. The auditory imagery was preceded by the visual in 55%, by the name in 24%, and by the motor processes in 13% of the cases. This shows the relative spontaneity of the different factors in the total process of recall, but not at all their relative value as aids to the recall of the sounds in detail.

According to the manner of its use, the visual imagery was of three kinds. (1) The visual imagery of the things that produced the sounds, used solely to recall the sounds in a general way or to start the auditory process. Attention to it for the recall of details was detrimental to the recall. (2) Visual imagery of the things going through the motions they would make in producing the sounds. This was used like the first and also sometimes to recall details. (3) Visual sound analogues, consisting of arbitrary forms, sometimes including colors, whose characteristics were patterned after characteristics of the sounds. These were used mainly for the recall of details. The first class was by far the most frequent.

Only the names of the things and never any verbal description of the sounds entered the recall. From the nature of the

case, therefore, the verbal processes present were never an aid to the recall of details.

The motor processes used in imitating the sounds were by far the most important factor in the recall of details. They were *inseparably connected with the effort to recall a sound vividly and minutely*, and constituted a necessary means to the same. They were the basis for measuring the duration of the sounds from memory, in which process all auditory imagery was entirely absent about as frequently as any was present, and when present was in the judgment of the observers no aid to making this measurement. The average error for all observers in these measurements ranged from 15% to 77% for the different sounds used. In general, the short sounds were overestimated, the long ones underestimated.

The auditory imagery itself was very fragmentary. According to the direct observations only a fourth to a half of the total sound could as a rule be recalled in auditory terms. Combining this with the observer's measurements of the sounds from memory, which were in individual instances often 50% too short, the indication is that the auditory imagery must have been often extraordinarily incomplete. In many individual cases direct observation verified this conclusion. The course of the auditory imagery was decidedly irregular, both with reference to its temporal continuity and with reference to the parts of the sounds it represented. It could not as a rule be voluntarily controlled directly, but only through the motor processes, or through visual imagery in some instances. Through these aids the sound was recalled fragment by fragment, leaving usually large gaps to be filled in by motor representatives alone.

MIRACLES OF HEALING[1]

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In approaching the psychological study of miracles of healing one can scarcely be expected to define the term miracle in any narrow sense, for one must study every form of the so-called miraculous from the most elemental form of naturism to the highest type of scientific or pseudo-scientific psychotherapy. The term may cover now one and now another class of phenomena as we deal with a low or a high type of belief or practice. For the purpose of this study it is even, to a large degree, immaterial whether the miraculous occurrences, or supposed occurrences, passed in review be accepted as facts or viewed as mere superstitions. We may thus, perhaps, largely escape entanglement in the discussion of a phase of the subject which has elicited a wider divergence of view, been productive of more superstition and the basis of more heresies than almost any other discussion relating to human thought. Whether based upon accepted facts or not the miracle psychosis is the result of the mind's reaction to a phenomenal world which constantly baffles satisfactory explanation. The everywhere prevalent belief in miracles of healing as facts presents problems of the origin, nature, causes, and significance of the beliefs as such. It is in short the miracle psychosis that we are most interested in. This we still have with us if we reject all the physical phenomena connected with it as untrue or as falsely interpreted.

It has become a canon among modern anthropologists that while the reactions of the human mind under the same set of circumstances may be strikingly different among different races, mental organization is in all fundamental points the same for all humanity. All are capable of abstraction, inhibition, and choice though of very different types. Two authorities on this

[1]The writer wishes to express his obligation to President G. Stanley Hall for suggesting the topic of this study and for constant help while it was in preparation; to Dr. A. F. Chamberlain for frequent assistance and advice as to the literature of the anthropological phases of the subject; to Dr. E. C. Sanford, Dr. W. H. Burnham, Dr. Theodate L. Smith, Dr. Louis N. Wilson, and to many of his fellow students in Clark University for their friendly interest and other valuable assistance.

point must suffice: Brinton who says (15,[1] p. 6) that "the laws of human thought are frightfully rigid, are indeed automatic and inflexible" and that all minds deal "with nearly the same objective facts in nearly the same subjective fashion, the differences being due to local and temporal causes." (p. 9.) Again, Boas who in his discussion of the mind of primitive man says (10b, pp. 1-11) "it would seem that, in different races, the organization of the mind is on the whole alike, and that the varieties of mind found in different races do not exceed, perhaps do not even reach, the amount of normal individual variation in each race." It is our purpose, in the first place, to show by a genetic study of the healing art that the ideas of the human race concerning disease and its cure establish this canon. In the second place, we hope, that as the study proceeds, we may discover and make somewhat more evident the laws of mind which condition its reaction to the phenomena which we study. In the third place, we shall hope to be able to show that the phenomena themselves while strikingly different when casually viewed from the outside, the real causes and effects being obscured beneath a mass of form, ceremony and superstitious or unscientific beliefs, are in reality dependent upon the action of certain now commonly recognized laws of mind, quite limited in number and of universal application. Further, we shall attempt, if these three points are well taken, to point a way to a more scientific view of the subject and to suggest some ways by which our knowledge may be made useful in the overthrow of superstition and to the positive benefiting of mankind both physically and mentally.

To the ends suggested our method is to be historical in so far as we study the development of beliefs regarding the healing art; comparative, that we may gather the common elements of the various beliefs; and psychological in attempting to discover some laws of mental life by means of which the phenomena observed may become more intelligible.

In order to determine with some degree of accuracy at what stage of his mental evolution man began to have thoughts about disease and its cure it seems necessary to sketch in brief outline the steps by which he developed, through reaction to a world full of movements, sights, and sounds, a mentality of a higher order than that of his animal ancestry.

The simplest normal human mind now to be found anywhere has its philosophy of life that, more or less crudely, attempts a solution of the great problems of fact and existence. For example, in all the history of modern anthropology no tribe of

[1]The numbers in parenthesis refer to the bibliography at the end of the paper.

people however low has been discovered which has not had some sort of religion. Many attempts have been made to reconstruct the mind of our earliest progenitors and make out the stages through which have been evolved thoughts of life, magic, medicine, religion, and philosophy. Too many of these attempts have been philosophical speculations based on few and often doubtful facts. It is only since anthropologists have advanced the view, noted above, that the mental constitution of man is essentially the same in every age and under every condition, that the importance of a careful, scientific study of existing customs, mythology, language, and archeology, as an aid to the retracing of the steps of psychic evolution, has been recognized. Since the adoption of this view there have been a few scientific men and women who have put themselves in a position to form an intimate acquaintance with the facts in these fields. It is in the main upon such studies and upon the further light to be gained from the modern "child study" movement that our conceptions of the naïve thought of the race should be based. The outline which follows is based upon such authority.[1]

It has been determined to the satisfaction of every competent authority that no artificial boundaries can be set up between the mind of man and that of the animal. There are stages of human thought so elemental as not to be capable of distinction from that of the animal. So nearly as we can determine, the consciousness of the animal is a nebulous, undifferentiated jumble of subject and object, of sensation and the thing sensed. According to Bogoras (10a), Clodd (20a), and many other authorities, such a state is to be found among low primitive tribes to-day. Environment and social intercourse have developed from this elemental state all the complex states of our now highly specialized consciousness. It is difficult to make out definite steps in such development, because the simplest conceptions remain and have the higher superimposed upon them. It is even possible that they develop side by side. In spite of this difficulty there is practical agreement upon some such development as we shall now trace.

The most elemental stage may be termed the *subjective* in which the objects and activities of the universe were not differentiated. The perception of motion and of the resistance to motion repeated again and again in the experience of the in-

[1]For the sake of brevity and because this discussion is not sufficiently germane to the general topic in hand we shall not quote authorities on the subject, although many have been consulted, but merely refer those who wish to investigate the grounds for our statements to a few of the best references in our bibliography viz.; 10a, 15, 18, 19, 20a, 37, 38a, 52, 53, 73, 79.

dividual led to a vague idea of *life*, in its earliest form little distinguished from motion itself. In this stage there was no conception of spirit. The object was self-active. The perception of motion suggested the invisible which aroused the emotion of fear which to Hobbes and to many since his day was the "natural seed of religion." The terrors of the storm, the resistance which his will met in all the objects and beings about him, the injuries which he received when he fell upon some object or it upon him, led man to a view which differs slightly and is, possibly, an advance upon the one just mentioned. This new view is the conception, still non-spiritual, of power or powers, everywhere evidently inferred from experiences with the self-activity of objects manifested in movement and life. Gradually the life of objects as manifested in power came to be considered as a thing in itself that could be conceived of as a transfigured form distinctly different from the ordinary, material form of the object. This transfigured form was not strictly a spirit but differed from the ordinary form as the body of man differed from the object. It was in short anthropomorphic, it acted as man acted, it embodied the living self-active power of the object. This conception had been made easier by mental note having been made of gross resemblances between the parts of the object and those of the human body. Next, probably through the phenomena of dreams, ecstasy, hypnotism, intoxication, insanity, death and the like taken with the observation of the shadow of his person and the echo of his voice which were sometimes perceptible and sometimes absent, man was led to conceive of the possibility of a separation of these two forms. The one becomes now purely material; the other spiritual. The self-active element of objects is now for the first time spiritualized. No permanent separation of the two forms, however, is yet thought possible. The spirit may leave its material envelope at will, temporaily, just as it was thought that the soul of man, now for the first time conceived of, could leave the body during sleep but must always return with awaking consciousness. The final step in this line of development is taken when a permanent separation of the two forms of the object is thought possible. The spirits resident in man's body and in every object or power about him are now free either to live in their material object or person or to separate themselves forever from their material form and continue an independent existence. All of these forms of thought are still prevalent among primitive peoples and some of them persist under the influences of the highest type of civilization.

Theories of the nature, form, and later the destiny of spirit naturally followed the conception of it. Religious thought still has much to do with such questions. As one or another theory

has held the field the thought of the race has developed into fetishism, totemism, anthropomorphism, metempsychosis, polytheism, or monotheism. Some have believed in the future life; others in nirvana as the ultimate end of spirit. Some have combined various ones of these views in strange proportions. Scarcely any large group of people is wholly free from a number of the crudest of the views here outlined. It is beyond our present purpose to trace the higher lines of thought in detail.

It is impossible to say at just which stage of his thinking man began to attempt an explanation of sickness, disease, and death and to devise means for their treatment. It seems certain, however, that it came with the spiritualization of the objects and powers of the world and the conception of these spirits as capable of action for good or evil, an inference easily drawn from experience. We shall now turn to a closer study of the thought of man along this line, illustrating as fully as space will permit.

Theories of Disease

All who have studied the medical lore of primitive and ancient civilizations agree with Hewitt (18, 21st, p. 134) and Fewkes (*ibid.* p. 15), to quote only the latter, that "primitive man regards everything as possessed of magic power allied with what we call life, capable of action for good or evil." This magic power as we have seen has been, in the animistic stage, spiritualized so that we are prepared to find with Bartels that in answer to the question, "What is sickness?" one gets, from the primitive man the ready answer that sickness is the influence of evil or ill-disposed spirits. The words in which this answer would be given might to the uninitiated confer quite a different impression, but would on careful study be found to mean nothing else. To illustrate the various ways in which this same fundamental idea would be expressed by different tribes, and even by different members of the same tribe, we can do no better than condense the exhaustive and extremely suggestive outline of Bartels. (2, pp. 49-72.) He suggests four common ways in which the evil spirit itself is the direct cause of sickness: 1. Sickness *is* a demon or it may be several demons; 2. The angry spirit of some deceased person; 3. The spirit of some animal; 4. A vampire or werewolf. In thus causing sickness the evil spirit may enter the body of its own accord; by direction of a witch or magician; by permission or at the command of the gods as a curse or punishment for wrong doing; by transfer from another person through the use of contagious magic. Again the ill-disposed spirit may make an external attack upon a person or may assume human form to

make such attack; it may steal away one's shadow, breath, life blood, or some vital organ; or by introducing into the victim's body some foreign object it may effect its evil purposes. The last of these views is very common and takes many strange forms. To enumerate only a few: disease is often caused by the presence in the body of something animate; as, a worm or other animal. Frequently the trouble is due to some inanimate body, visible or invisible, which is to be found on or in the body of the patient or the particular part affected. Within these two classes almost every conceivable object has been considered a cause. No purely physical agent, however, is ever sufficient in itself as an explanation to the primitive man. Each ailment is without exception dependent in some way upon the presence (possession) or action of some spirit.

Disease and Death Unnatural

To the mind of primitive man the idea of disease and death from natural causes is almost unknown. According to Decle (64, p. 117) the natives all over Africa have no conception of death as a natural occurrence. Numerous other observers confirm this opinion. The Cherokee myth (18, 7th, p. 319) which accounts for the origin of disease and death tells us that in the olden time the animals and man lived peaceably together and disease and death were not known. As time went on, however, men increased so rapidly that they began to crowd the animals and, not only so, but with the invention of the instruments of the chase, began to kill them for their flesh and skins. In self protection the animals held a conference and retaliated by sending death and all sorts of disease upon man. The same myth also accounts for the healing art which was made possible by the plant world which was friendly to man. To defeat the purposes of the animals each plant offered itself as a remedy for some disease. So the Cherokee, even to the present time, believes that disease and death are unnatural and that there is always some plant, if we could only know it and invoke its aid, whose spirit would come and defeat the evil influences of animal spirits, ghosts, and witches. The Shaker Indians (18, 14th) of Puget Sound believe that disease came as a punishment for lacerating the bosom of mother earth. "In Egypt," says Maspero (57), "man does not die, but some one or something assassinates him." Spencer and Gillen (78, p. 476) find no belief in natural death among the Central Australians, for "however old or decrepit a man or woman may be when this takes place it is at once supposed that it has been brought about by the magic influence of some enemy." Roth's study (72) bears out the same statement for other Australian tribes. An Australian native, according to Lumholtz, "is unable to

conceive death as natural, while diseases and plagues are always ascribed to witchcraft and to hostile blacks". In short, wherever the evil spirit theory is strictly held there is no room for the conception of disease and death as natural.

Evil Spirit Theory Illustrated

The universality of the evil spirit theory may, perhaps, be made more evident by some specific illustrations. The Malay belief is that mischiefs (*i. e.* spirits) reside in all objects animate and inanimate which get into man and cause disease. The ancient Egyptians divided the body into thirty-six parts, for each of which there was a particular demon. The Babylonians attributed all diseases to demons and the Assyrians had a special one for each disease. In China, Tartary and Japan the evil spirit theory was once universal. Mooney (60) finds that the folk-medicine of Ireland assigns three causes for disease—fairies, the evil eye, and witchcraft. Roth's extensive study (72) among the Australian tribes reveals the fact that most accidents, ills, and diseases are thought to be caused by a "dooming" of the victim either by nature spirits or enemies, living or dead. The demon theory has not been entirely outgrown even in the most civilized countries of the present day although the tendency everywhere is to attribute fewer diseases to it.

The belief in witchcraft is scarcely less universal and, indeed, is only one phase of the evil spirit theory. The Egyptian physician of the olden time, as Maspero (57, p. 213) shows, was credited with all the powers of magic, sorcery, and witchcraft by which he could cause as well as cure disease having by these means the mastery over evil spirits. The sorcerer believed that if he could procure something belonging to an individual he could exercise complete control over him. A few nail parings, hairs, a piece of his clothing, or a drop of his blood embedded in a wax doll made it possible for him to inflict on the individual anything that he could inflict on the image. This is the real meaning of the removal of the scalp lock of an enemy, its possession making the soul of the owner subject to the warrior procuring it. "The illnesses to which the human race is prone," says Maspero, "were not indeed all brought about by enchanters relentlessly persecuting their enemies, but they were all attributed to the presence of an invisible being, whether specter or demon, who by some supernatural means had been made to enter the patient, or who, unbidden had by malice or necessity taken up his abode within him."

In China, Japan, India, and all those countries that came under the influence of the Buddhist religion the belief was universally held that disease was in many cases a punishment

sent by the gods for some sin committed either in the present life or in some previous state of existence. Many Chinamen will refuse to rescue a drowning man for fear of interfering with the fates ordained by the gods and thus bringing misfortune on themselves. The Greeks believed the plague a direct visitation of the gods and therefore refused to use any means to stay its ravages. Bartels (2) cites several instances in which savage peoples attribute certain diseases—notably small-pox, measles, and other epidemics—to the anger of the gods, although this belief is not so common among primitive as among civilized peoples and those especially who have come under the influence of Islam and Christianity. Here the principle is the same although the spirits are good spirits angered or ill-disposed.

The anger of an enemy or a deceased relative is responsible for many ills. The Baganda of Uganda (50: 4, p. 124) believe that the spirits of dead relatives that have not been becomingly interred haunt their living kindred and cause sickness and even death if the offence is not in some way atoned for. The natives of Australia have a similar fear of the spirits of enemies killed in battle. In New Guinea a widow must observe carefully many rules in order that the spirit of her husband may not make her sick. In many countries the spirits of still born children, or of those that die very young, of those who die of small-pox or the pest, of those dying suddenly and the like are very much to be feared for their powers of causing many kinds of disease.

The evil eye is widely feared and persons reputed to be possessed of such power are scrupulously avoided and are usually regarded as witches. Mooney (60, p. 146) states that "the belief in the evil eye is general throughout Ireland as well as throughout the greater portion of Europe and Asia," but thinks it is too subtle and intangible an idea for most savages. The idea is not lacking in the current folk-lore and superstition of this country.

The belief, common to all grades of civilization, that many diseases may be transferred, no doubt owes its origin partly to the contagion of certain diseases although it is by no means confined to these. One may for example transfer his sickness to another by placing a piece of money, food, an article of clothing, or any of his belongings on a path or in some conspicuous place where it is likely to attract attention. The first person, or even bird or animal, that touches or picks up the object is immediately afflicted with the disease and the original sufferer restored to health. The underlying thought here is clearly that of contagious magic (38a, p. 2) by means of which the evil spirit is persuaded or compelled to take up a new abode.

There are beliefs scarcely capable of classification. The Yakuts of Northern Siberia (50:4) believe that man has three shadows; if he loses one he will fall sick, while if he loses all three he pays the penalty with his life. The Tchouktchis believe(10a) that man has many souls some of which he may lose without serious trouble, but if he loses too many he becomes weak or ill. Many tribes believe that spirits of men and animals come stealthily by night and steal away a vital organ thus causing disease. The "doom" of the native Australian often means that his blood has been made bad or removed from his body by an enemy. By the same people consumption is thought to be due to the insertion by magic of a rope reaching from just below the Adam's apple down into the chest. Among the many other causes are the quartz crystals, pebbles, splinters, bones and the like which are inserted in the body by witchcraft; the magic wounds; the influence of bad winds, or water spirits, of charms, of fire, of the rainbow and other natural phenomena; the infringement of the *tabu;* and so through a list as numerous and diverse as it is possible for the minds of men to conceive. Our illustrations are necessarily limited in number and scope but are perhaps sufficient for our purpose which has been to show that everywhere the supernatural spirit theory is the prevalent theory of disease.

The Primitive Healing Art

Almost all observers are agreed upon the fact of the intimate relation of religion and medicine. Not only do we find among all primitive and ancient peoples a close relation in practice, but most of the accounts of the origin of the healing art are mythological and colored with religious ideas. A good example is that of the Menomini Indians (18 : 14th) who relate how a great "manitou" came to earth and chose a wife of the children of men. Of the four sons to which she gave birth, the first went to the spirit world when he arrived at manhood and learned all the mysteries of the "grand medicine." He then returned to earth and giving each of his family a medicine bag revealed to them the mysteries and told them to perpetuate the ceremonies into which he had initiated them, after which he departed and has since remained the intercessor with the Great Spirit. In ancient China, Japan, and Tartary we find a religion of shamanism, worshipping magical powers above all else. So, too, in Chaldea where Maspero (57, p. 780) finds that "consultations and medical treatment were religious offices, in which were involved purifications, offerings and a whole ritual of mysterious words and gestures." Among the Ojibwa, as with most other Indian tribes, the practice of magic and medi-

cine is limited to those who belong to the great medicine society into which they must be initiated by religious ceremonies comprising four degrees. For the Romans Cicero declared: "the art of medicine has been consecrated by the invention of the immortal gods." Mooney (18) finds that "among the Indians the profession of medicine and religion are inseparable. The doctor is always priest, and the priest is always doctor"—an opinion from which few would dissent, even if it had been applied to all primitive peoples.

The Medicine Man. Since man has quite generally felt his inability to cope with disease and ill fortune unaided he has ever been ready to choose as an intercessor some one who possessed greater knowledge, wisdom, and power over the unseen agencies which his fancy created. The medicine man is almost universally raised above the common people, now trusted, now feared and hated, but always exerting a tremendous influence on all phases of primitive life. It is because in him are vested both medical and priestly functions that it is so difficult to separate form, ritual, and ceremony from the healing art. He is usually at once priest, physician, sorcerer, seer, and prophet.[1] He lives a life apart from his fellows; sleeps in a tent which stands apart and differs in structure from those of the common people; as a rule he does not work, but is supported by gifts and fees from his patients; he eats different food; wears robes which designate his station, and ornaments, paints, masks and many such things as are denied the common man. In some cases his office has come to him by heredity, or it may be some mark upon his person, even some deformity, has set him apart as a fit depository of divine power. Again some strange fact about his birth; a misfortune; a dream of his or of his friends about him; some manifestation of unusual power; or the supposed entrance of the spirit of a deceased shaman into him may set forth his fitness to become a great medicine man.

Whatever may be the nature of his call, he is usually prepared for entrance into his sacred vocation by fasting, prayer, and solitude; then, by hallucination or in a dream, his guardian spirit is revealed to him and by virtue of its power he does his mighty works. In some cases nothing further is required of him in preparation for his work, but with many of our North American Indian tribes he has still to serve an apprenticeship under an older man and learn by imitation the secrets of hypnotic influence, the methods of discovering and preparing remedies, the use of the drum, rattle, medicine lodge, and other

[1] In some tribes the religious "man of mystery" is to be distinguished from the magician—healer. See 50a, Vol. XVIII, pp. 269-275; also 18, Bul. 30, under "medicine man."

insignia of the office before he can stand the examination and approbation of his fellow shamans and be initiated into the "grand medicine society" with due form and ceremony.

Among the Indians, the Australian aborigines, and some other tribes the "medicine bag" is indispensable. The shaman carefully dries some medicine, prepared with due ceremony, and puts it, with other relics, as bones, pebbles, splinters, and the like, that have been extracted from some patient, into a bag made of the skin of his totemic animal with the hair on the outside and further decorated with beads, bones, feathers, porcupine quills, etc. This he always carries with him and about it centres a vast amount of mystery and superstition.

We have spoken thus far of men as shamans, but they are not always men; in fact, in some tribes, women are considered so far superior that the man who would be a good shaman must adopt the clothing and so far as possible the characteristics of the woman. This is especially true of the Yakuts of Siberia where the most powerful and most respected shamans are women.

Some shamans have medical books and all of them have a fund of lore that recounts chiefly the names of the evil spirits that cause disease and gives formulæ for their expulsion or advises offerings, plants, and other remedies for the same purpose. When the medicine man dies we usually hear little about it, or if we do it is that his spirit has entered into some young man and lives on with, perhaps, increasing power with the new incarnation.

Diagnosis. The diagnosis of disease consists in the first place in discovering whether the sickness is due to the anger of an offended deity, a broken *tabu*, the presence of a spirit, the loss of the breath-body, shadow, kidney fat, blood, or what not; or to the presence of some foreign object introduced, by witchcraft or magic, into the patient's body. In the second place the medicine man must discover what offering will propitiate the deity or evil spirit; what charm, incantation, or good spirit will restore the lost part, or counteract the malevolent spell under which the patient is suffering; or by what means the foreign object may be extracted, or the spirit exorcised and made thenceforth harmless.

The ways in which these objects are accomplished is what most interests us. The methods to be pursued and the means to be used are almost always supernaturally discovered. In some cases a prophet advises the medicine man as to the method of procedure; in others a woman is put into the hypnotic state, or a clairvoyant or spiritualistic medium is employed to "see" the cause and report to the shaman; or he may himself, in an ecstasy or a dream, see the cause and have the remedy suggested

to him. A method which with some variations is used by nearly all our Indian tribes runs somewhat as follows: the medicine man, after a sweat bath and a stimulating drink, enters his medicine lodge where after much beating of drums and shaking of rattles, after prolonged dancing, shouting, groaning, screeching, beating of himself and invoking of his genius he works himself up into a condition favorable for the reception of the divine impulse, the spirits come and reveal to him the cause of the disease and a suitable remedy. Then, in the words of Charlevoix (18, 14th, p. 139), "full of his pretended divinity, and more like a person possessed by the devil than one inspired by Heaven, he pronounces in a positive tone of voice on the state of the patient, and sometimes guesses tolerably just."

Methods of Treatment, Exorcism, etc. If the first theory of disease was the evil spirit theory, the first reasoned treatment of it must have been entirely by magical means. The only methods admissible on such a theory are conciliation, transfer, or expulsion of the supernatural agent. The great variety of ways in which these ends were accomplished a few examples may illustrate. The shamans of the Algonquian, Ojibwa, Apache, Sioux, Sia, and other Indian tribes as well as the Malays, Australian blacks, and peoples in other parts of the world have a simple magical procedure known as the sucking method. Placing the mouth, a hollow bone, or a rope over the seat of disease they proceed to suck vigorously until the spirit, the immediate cause of disease is drawn out and disposed of in some way. The Malays (76) frequently construct a basket, which they fill with food and other offerings to attract the evil spirit. When it has accomplished this end, the basket and its occupant are set afloat on the river or taken to a desolate part of the forest and left. Others drown the spirit in a bowl of water or command it to leave the place. Among the Egyptians the disease demons were supposed to obey the gods, so when the healer was practising his art he assumed the personality of the divinity to whom the disease demon, with which he chanced to be dealing, was supposed to be especially amenable and was then ready to command the spirit as if he were the very god whom he personated. He even had the power to call to his assistance other divinities if he deemed it necessary.

Chaldea had sorcerers and exorcists who were experts in casting out, by magical means, demons and spirits which caused disease to the body they inhabited. The magician sometimes lighted a fire of herbs the clear flame of which was believed to frighten away the spirits and their evil influence. Accompanying this, to add to its effect, a prayer was offered

in which the enchantments and their expected results were described.

In China, Japan, the Malay Peninsula, and among numerous primitive as well as with more civilized peoples, prayers and ceremonies are used to induce the destroying demon to remove his baleful influence. The most common method of treatment with the Bering Strait Eskimo is the incantation of the shaman. With the Malay and some African tribes the evil spirits are propitiated by offerings, or conjured or tricked from their human habitations in various ways. In one of the cases described by Skeat (76, p. 429) the shaman mixed some pulverized woods in water with which he washed the patient's body; then with a bunch of leaves, he brushed the patient from head to foot till at last the spirit was driven out; when with his dagger the shaman succeeded, after much ado, in destroying it. The Yakuts (50:4, p. 99) apply fire to the part where the *yor* is supposed to be until the bursting of the skin apprises them of the exit of the evil spirit.

The ancient Greeks believed that disease demons were to be conciliated by lustrations, invocations, prayers, offerings, and music; and one cannot fail to note the prominent place that music, or perhaps more truthfully noise, holds in the treatment of the sick by many primitive peoples. As a rule its purpose is ostensibly to frighten or conciliate the spirit of disease.

When disease is supposed to be due to any of the causes more indirectly traceable to the influence of evil spirits, the methods of treatment are not essentially different. The sucking ceremony mentioned above is often used to extract poison, a stone, a splinter of wood or bone, or other object that has been conjured into the body. Sometimes the Malay shaman cures by rubbing the body over with a piece of dough which gathers up the object causing the trouble (76). The same people often consider breathing on the patient or on the medicine an effectual means. "The miraculous cures of the Messiah," says Burton, "were, according to the Moslems mostly performed by aspiration." (Arabian Nights V, p. 30). The folk-lore of all peoples is full of magic means of many kinds with which to combat every sort of disease. White magic can suspend the law of destiny, combat the influence of secondary deities, the evil eye, and spells cast by evil persons. Some of these magic means deserve more detailed treatment.

Amulets, Charms, Talismans, Magic Formulæ, etc. In his study of the history of medicine Berdoe (4, p. 247) comes to the conclusion that, "in the ancient world as well as with savages, the whole art of medicine was in many cases the art of preparing amulets and charms." These things either cause, prevent, or cure disease according to the method of their em-

ployment; all are based on a conception of a supernatural origin of disease; and all depend for their success, where they have any, upon their effect upon the mind of the person invoking their aid. Erdman (34, p. 353) tells us that in ancient Egypt, men and even the gods, "wore amulets as a protection, and used magical formulæ to *constrain* each other." The dead wore amulets against the evils of the next world as the living against those of the present. Certain objects were given lasting magical power by having a formula recited over them, and as of old the modern Egyptian wears amulets and written charms and puts great faith in the magical preparations of the higher theurgy. Quackery and sympathetic cures by means of amulets, magic words, laying on of hands, symbolic washings and the like were very common in ancient Greece. In Chaldea one of the infallible cures was a charm knotted with seven knots which was bound to the patient who was then sprinkled with holy water. Throughout all their history, astrology, charms, amulets, and charact enter largely into Chinese and Japanese practice. "There is scarcely a disease," says Pettegrew (68, p. 78), "for which a charm has not been given." In the early Christian centuries Gnosticism was reponsible for the introduction of many wonder-working charms and amulets. Some of the old Anglo-Saxon monks made use of amulets and their countrymen have never ceased to do the same.

The most scientific men of Greece and other countries of antiquity were unable to free themselves entirely from a superstitious faith in magic formulæ. Even Galen the great Greek medical reformer and authority of the second century A. D. did homage to incantations, having been convinced against his previous conviction that "many of them are excellent severally and they reach their mark." But there were fine distinctions even in his day for he denounced Pamphilos for using incantations "not merely useless, not merely unprofessional, but all false." (4, p. 253.) Erdman (34, p. 353) states that "the belief that there were words and actions by which they could produce an effect on the powers of nature, upon every living being, upon animals, and even upon gods, was indissolubly connected with all the actions of the Egyptians." The formulæ used by the magicians were believed to be revelations from the gods themselves. They were made up wholly or in part of words from some foreign tongue or of a meaningless jargon, and the more mysterious and difficult of understanding they were the greater their power was thought to be. Written words were by many of the peoples of the olden times believed to have magic power. In Egypt even to the present time pieces of paper inscribed with texts from the Koran are swallowed and beneficial results are fully expected. In many places magic formulæ are written

on pieces of wood or slate which are then washed with water and the water used as a powerful medicine. Some of the Jews believed that Jesus had learned the Mirific WORD (true pronunciation of the word Jehovah) and by its use was able to cure diseases. The early Christian church opposed these superstitions; but so deep seated was the faith in them among her converts that the best that could be done was to substitute Christian names for heathen ones and allow their use to be continued. Peters (67, p. 163) tells us that in the folk-medicine of Germany very many cures are yet made by magic formulæ; and that in many parts of the country "*Besprechen und Stillen*" are means of healing which the inhabitants still prefer, in cases of sickness, to the help of a physician.

Use, Preparation, and Discovery of Remedies. The early use of remedies was closely connected with the spirit theory of disease. Almost all ancient and modern peoples have used certain plants as remedies; but in early times, at least, this was from no idea of their physiological effect, but because they were supposed to be distasteful to the disease demons which afflicted men. In Chaldea as in Egypt the records show that greatest reliance was placed in grotesque and revolting remedies fitted to excite disgust in the tormenting demon that caused disease. Maspero (57, p. 782) finds that although the Chaldeans were not ignorant of the natural virtues and uses of herbs, their physicians esteemed more highly prescriptions "which pandered to the popular craving for the supernatural." Even natural remedies were only made effectual by supernatural means. There were certain days for gathering each plant, definite formulæ to be recited as the plant was pulled from the ground, others as the mysterious cooking, filtering, etc., were in progress with their accompaniment of murmuring, singing, and exorcising of evil spirits that might enter and render the preparation ineffective. Again, as they were being administered to the patient, suitable formulæ and incantations recounting the effects that were attributed to and expected from their action must accompany their use. In this way the employment of natural remedies was confined largely to the physician, for only the inner circle knew the necessary formulæ and charms without which no remedy would be of any avail. This conception prevailed also with the ancient Hindu and Persian and finds its place to-day among almost all primitive peoples and to a surprising degree among many more civilized races as we shall see.

Again, there have been times in the history of almost every people when sympathetic magic measured the value of many remedies. Under this conception, some real or fancied resemblance between the remedy and the bodily organ to be

cured was the basis of evaluation. So far is this idea carried among the Cherokee that Mooney (18, 7th, p. 329) is convinced that "Cherokee medicine is an empiric development of the fetish idea." Of the plants used by them he finds that only one-third possess real medical virtue, the other two-thirds being inert, if not positively injurious. Thus we see that the doctrine of signatures had much more to do in directing to the choice of proper remedies than their actual physiological effect. This idea of "like cures like" carries us back to that stage of man's thought in which he sought out and gave special meaning to each slightest resemblance between himself and objective nature. The conservatism of human thought has preserved it, however, so that it still holds a prominent place in the folk-medicine of every race civilized or otherwise.

In this connection Bourke (13) has written in a most careful manner one of the darkest and most repulsive chapters in the history of primitive and folk-medicine. He shows that the use of all sorts of nameless remedies both current and extinct are to be traced to a religious origin. One of the best examples has to do with the Grand Lama of Tibet who is revered by his subjects as a divinity. Maltebrun asserts (13, p. 42) that "it is a certain fact that the refuse excreted from his body is collected with sacred solicitude to be employed as amulets and infallible antidotes to disease." Gilmour (p. 47) has observed that "when famous lamas die and their bodies are burnt, little white pills are reported as found among the ashes and sold for large sums to the devout as being the concentrated virtues of the man and possessing the power of insuring a happy future for him who swallows one near death."

Vambery tells of a holy Turkoman who sold as a wonder-working medicine a cup of water over which he had recited numerous sacred verses and into which he had expectorated at the end of each stanza (p. 48). In like manner we are told in the Arabian Nights (II, p. 222) how the excrement of ecclesiastical dignitaries was sold at a high price and used as a remedy for many diseases. So, too, the indestructible parts of the bodies of the Buddhas and saints are accorded curative powers by the Buddhists (p. 49). On the same principle are numerous legends (p. 57) relating to the curative properties of articles in any way connected with the body of Jesus; *e. g.*, the water in which Mary washed the infant Jesus, the touch of his swaddling clothes, the water in which his body was washed in preparation for burial, the bandage with which he was blindfolded, his blood, the crown of thorns, cross, cup, etc., are all said to have been used in healing many diseases. In both Ireland and England the water in which the chalice used by the priest at communion is washed is given to delicate chil-

dren or those having whooping cough as they are thus supposed to partake of some of the real blood of Jesus (9, p. 88).

A slightly different class of religious facts noted by Bourke (p. 97) have also much significance for the healing art. It is because of a religious conception that "the pranks and gibberish of the maniac or the idiot are solemnly treasured as outbursts of inspiration" and it was at first to the end of producing a state of religious ecstasy that the intoxicating mushroom, mistletoe, rue, ivy, mandrake, hemp, opium, and stramonium were used; but the insane talk of the mental pervert and the revelations of the religious ecstatic have often served as guides to the treatment of disease, and the natural intoxicants we have enumerated have often been used simply as medicines when their religious significance has become somewhat forgotten. For example: the mistletoe, called "all heal" by the Druids, has been used in many countries and many centuries even to the present for the cure of epilepsy, rupture, fits, sterility, for exorcism of evil spirits, and as amulets for a great number of other diseases.

It seems hardly advisable to record here the many more revolting practices connected with the healing art throughout theentire world; all the more degrading because of their close relation to religion which has always been the revealer of that which is best in man; but, deplore it as we may, the fact remains as Bourke has shown (p. 333) that "excrementitious remedies are still to be met with in the folk-medicine of various countries; indeed the problem would be to determine in what country of the world at the present day the more ignorant classes do not still use them." Indeed, in her study of the folk medicine of our own country, Mrs. Bergen finds many remedies of so offensive a character that it seems almost incredible that they "can still retain a place in even the rudest traditional pharmacopœia" except we admit that there is "in the uneducated human mind a sort of reverence for or faith in that which is in itself disagreeable or repulsive." (Pop. Sci. Mo., 33, p. 658.)

Faith in the Medicine Man. It is interesting to know what attitude the medicine man inspires in his patients. On this point some valuable data are at hand as to both ancient and modern times. Especially valuable is the testimony of those men who have made recent close studies at first hand and put themselves in a position to observe the healer at his work.[1]

[1]Such studies as those of Mooney (18, 7th and 14th), Hoffman (18, *ibid.*), Stevenson (18, 8th), Bourke (18, 9th), Mrs. Stevenson, Turner and Dorsey (18, 11th) in this country, Roth (72) in Australia and Sieroshevski (50, 4) in Siberia are mines of scientific data of the utmost psychological importance.

Berdoe (4) points out that in ancient Greece, the stories of miraculous cures, the many offerings and images left in the temple by grateful patients to commemorate their cures, and the divination, magic, and astrology used by the priests to discover the proper remedies, all tended to inspire in the patient the greatest hope and expectancy for his recovery and are strong evidence that "faith was the *sine qua non* in the patient." He is also convinced that although different means were employed the same attitude toward the healer was conserved among the Chaldeans.

Bourke in his study of the Apache Indians finds that their medicine men are credited with many wonderful powers. They cause rain, hail, tempests; they call up the shades of the dead and consult them; they handle serpents, swallow spear heads, arrows, fire; they locate lost property by crystal gazing; they kill and bring to life, and by many other means strengthen their hold on the people. In the same study (18, 9th, p. 473) Bourke quotes Dr. Fordyce Grinnell to the effect that "the Apache scouts seem to prefer their own medicine men when seriously ill, and believe the wierd singing and praying around the couch is more effective than the medicine dealt out by our camp 'sawbones.'"

Mooney (18, 7th, p. 323) finds that the Cherokee "has the same implicit confidence in the shaman that a child has in a more intelligent physician. The ceremonies and prayers are well calculated to inspire this feeling, and the effect thus produced upon the mind of the sick man undoubtedly reacts favorably upon his physical organization."

The Hudson Bay Eskimo is not so loyal to his own medicine men as some of our Indians, but his faith in the supernatural is no less for that reason. Turner (18, 11th, p. 270) tells us that magical cures are sometimes effected by harmless concoctions of ignorant white traders so great is their faith in such remedies. "Powders are rubbed over the seat of pain and liniments are swallowed with avidity. Strange as it may seem they often report good effects, and rarely fail to ask for more of the same kind." Hoffman (18, 14th) thinks there is no doubt but that the Menomini believe their medicine men possess great power, and he himself was unable in six years of careful observation of their ceremonies to detect imposition. Spencer and Gillen find that the central Australians have implicit faith in their medicine men (78, p. 530). Most observers are convinced of the honesty and sincerity of the great majority of the medicine men themselves (18, Bull. 30, medicine man), although there are, no doubt, some imposters among them.

The Place of Magic and Miracle

After all this array of facts the question naturally arises: to what extent is the total practice of primitive and ancient peoples here represented? This question we shall try to answer.

In later Chaldean times there were two schools of priest-doctors: (1) those who relied on magic entirely; (2) those who taught that disease was the result of sin and that repentance was the way to cure. In time there came also to be a class of physicians who used only simple natural means. But those who used magic, charms, prayers, and incantations were still held in higher esteem and accorded greater powers. In Egypt the profession of Medicine has always been surrounded with the greatest secrecy; its practice strictly limited to the initiated; and the mysterious and magical element preserved by forbidding the laity to practice and thus become familiar with its means.

Although many of the orthodox Buddhistic teachings of the present and more recent centuries would seem to preclude the possibility of such practices as those we have found current among other races, the sacred literature of the Hindus which reaches back several thousand years reveals a large element of magic and miracle in their early healing art. Buddhistic, Brahmin, and Jainistic monks are now forbidden to use magic arts, and efforts have been made to discredit the *Atharva-veda-Samhita* and exclude it from the sacred canon. For these reasons it is of special interest as a source of knowledge of the folk medicine which grew up before the priestly religion had developed opposition to such beliefs and practices. From the *Atharva-veda* (61, Vol. XLII) itself and from Winternitz (88) we gather that in earliest times the priests of the people were at the same time magicians and sorcerers as the name Magi, applied to the ancient Atharvans, would indicate. The ancient name for the *Atharva-veda* itself has the signification of both white and black magic and its purpose as stated by the Hindus is "to conciliate (demons), to bless (friends), and to curse (enemies)." It is made up chiefly of songs and speeches for the healing of diseases. In it we find the belief in demons as the cause of disease in many of the usual ways, the belief in incubi and succubi, and in exorcism. There are formulæ for insuring long life, for purification from sin and guilt, for restoration of harmony in households and between lovers. Winternitz (88, p. 111) finds that the *Atharva-veda* has preserved for us, in its magic songs and rites, many ideas which are still current, and that it contains "numerous verses which in their character and often also in their content are as little different from the incantations of the Indian medicine men and

the Tartar shaman as from the Merseberg charms which belong to the small remnant of the oldest German poetry."

About the same may be said of the Parsees as appears from their sacred book the *Zend-Avesta*. The belief in evil spirits, demons, magic, etc., and the same sort of prayers, incantations, charms, and formal ceremonies to ward off evil or to cure disease, are to be found here as in the *Atharva-veda*. We are told (61, pp. 219, and 229) how Angra Mainyu, a helper of Ahriman, created 99,999 diseases to afflict men and how they were defeated by the 10,000 healing plants which Ahura Mazda brought down from heaven, by Airyaman's permission, for the use of Thrita a priest of the god of life and health. Here is recorded the belief in the supernatural origin of both disease and the healing art, the intimate relation of religious and magic ceremonies, and proof of the fact that originally the two were not distinguished. Whatever the later scientific developments may have introduced in the way of treatment for disease, the sacred literature of both the Hindu and the Parsee in its original purity reveals nothing that does not have in it an element of the supernatural. The healer among healers was he who healed by the holy WORD.

To Blümner (10, p. 238-9) "the healing processes to which the priests of the Æsculapian sanctuaries resorted seem to have occupied a very doubtful position between empirical therapeutics and superstitious hocus-pocus" and are to be "especially distinguished from those of the professional physicians by the veil of secrecy and miracle which surrounds them, since they rightly understood that the love of wonders among the common people would always bring them success." Every one is familiar with the popularity of these more miraculous methods of cure in Greek times, and with the great difficulty which medical reformers experienced in their attempts at the introduction of the scientific spirit in medicine.

The Romans had no systems of treating disease but by prayers, charms, prescriptions from the Sibyline books, and a crude domestic surgery and medicine, until they learned from the Greeks. The practice of the average physician was a combination of superstition and legerdemain.

While savage and primitive peoples undoubtedly know something of surgery and the use of materia medica, baths, massage, and the like, it cannot but be evident from what we have already said that their treatment of most diseases is largely or wholly by magic and supernatural means and that even real therapeutic means were given supernatural rather than the natural significance. We may safely say that in so far as diseases have, to them, no natural cause; in so far they have no strictly natural means for their treatment. However simple and natural the

explanation of their methods may appear to us, and however absurd the expected results of many of their procedures, we must recognize the fact that to them these things were miraculous and no result which was conceivable to them was theoretically impossible of achievement.

Hebrew Miracles

Old Testament Times. Little has been said so far of the Hebrew miracles of healing which have always attracted, in Christian countries, more attention than any others because of the special significance that has been attached to them. We must give them the somewhat special treatment which they deserve and trace their connection with the miracles of both earlier and later times. It is undoubtedly true that, living in the midst of a civilization permeated by the influence of magic and superstition, the Hebrews as a people were less given over to such practices than any other people of the time. The reason is to be found in the superiority of their religious ideals and the necessary modifications of primitive beliefs which their strict monotheism involved. But even here we may find many traces of primitive conceptions of disease and its cure. Indeed it is inconceivable that the Chaldean father of the race should not have retained some of the ideas so prevalent in that land from which he set out as a pilgrim. Knowing what we do of the influence of surrounding nations upon the Hebrews in other particulars all through their history it would be hard to believe that they had exercised no influence upon them in this one respect. However this may have been, we are not left wholly to conjecture in the matter for whether through the influence of surrounding nations, which seems evident in many cases, or by an indigenous growth along lines normal to every human mind there is to be found abundant evidence that among the ancient Hebrews many primitive views prevailed.

To the orthodox Hebrew disease was of penal origin and might be inflicted by Satan, or by the agency of evil spirits when permitted, or by a direct visitation from God himself as a punishment for sin either personal or parental. In several instances in the Old Testament the prophets were instrumental in bringing leprosy, blindness, and even death upon the sinful by calling down the just judgment of God upon them. Under this conception God was the only physician of his people and his blessing and forgiveness were the effectual means of cure.

But not all Hebrews were orthodox, and the Bible, the Apocrypha, the Talmud, and Hebrew tradition bear witness to the fact that as idolatry lived and flourished in the very palace of the kings so the superstition and magic of Chaldea, Assyria,

Babylonia, Egypt, and "the peoples of the land" flourished among the Hebrew populace. Whether the crude ideas of disease and its cure which prevailed among them were borrowed from these surrounding nations, or developed indigenously, is a matter of much less importance than is the fact that in no one of their conceptions did they differ materially from other ancient or primitive peoples which we have studied.

It is true that we have little positive evidence from the Old Testament as to the general practice of the people in the cases of ordinary sickness except that it was continually impressed upon them that the Lord would heal all their diseases. The provisions of the Levitical law for leprosy and kindred diseases were hygienic rather than medical; the consultation was with the priest and was preceded or accompanied by offerings and ceremonial observances. Most of the miraculous cures recorded in the Old Testament were performed through the power or intercession of the prophets. When David's child was at the point of death it was Nathan the Prophet whom he besought to save his life; when Jeroboam's son was sick he called for Ahijah the prophet; it was Elijah who raised the son of the widow of Zarephath to life; Elisha who restored the Shunammite's son; Isaiah who brought the answer to Hezekiah's prayer and directed the means for his recovery; it was Elisha's bones that restored the dead man to life; Moses's intercession which procured the cure of Miriam's leprosy; and it was the Man of God who restored Jeroboam's withered hand. As these comprise most of the miracles of the Old Testament, it is evident that here, as with most other peoples, the office of priest, prophet, seer, and physician are closely related.

There is considerable circumstantial evidence that the practices of the peoples of the land of Canaan, as well as those of other surrounding nations with which they had dealings, were quite prevalent among the Hebrews. The jealousy ordeal of Numbers 5:17 has its parallels in primitive medicine as well as in all Mohammedan countries, where we should call it magic. This drink, composed of holy water into which the priest put some dust from the floor of the sanctuary and into which he washed the curses against unfaithfulness which he had previously written on a parchment, the accused was forced to drink. This is "the bitter water which causeth the curse." If innocent the accused received no harm, while the guilty could not drink with impunity. The miraculous healing of those bitten by the "fiery serpents" by means of the brazen serpent which Moses lifted up in the wilderness, bears striking resemblance to the theory of sympathetic magic. It seems evident that Rachael and Leah (Gen. 30:14-16) knew the reputed magic power so universally attributed by primitive

peoples to the mandrake. The beneficial effect of music was recognized when Saul was troubled by the evil spirit from the Lord. The plague is represented as a destroying angel and in one case was stayed by incense which Moses and Aaron carried among the people, in another by an angel of the Lord.

The belief in all the arts of magic, witchcraft, divination, enchantments, etc., seems to have flourished all through Old Testament times in spite of the opposition which the prophets and religious leaders of the people continually waged against it.[1] Balaam, who is spoken of as a soothsayer, was certainly believed in by the Hebrews. The Moabites came to him with the "rewards of divination in their hands," but he refused and (Num. 24:1) "went not as at other times, to seek enchantments," but "saw the vision of the Almighty, falling into a trance, but having his eyes open," and declared (Num. 23:23) "surely there is no enchantment against Jacob neither is there any divination against Israel." True, Balaam was not a Hebrew, and consultations with familiar spirits were denounced, but still there seems to have been among the people a belief in these things all the while. The Levitical law "thou shalt not suffer a witch to live" is in itself evidence of the belief in witchcraft even with the law giver. Deut. 18:10-11 says: "there shall not be found among you any one that maketh his son or his daughter to pass through the fire, or that useth divination, or an observer of times, or an enchanter, or a witch, or a charmer, or a consulter with familiar spirits, or a wizard, or a necromancer," things which they were warned not to learn from the people of the land. Saul, however, found occasion to put away those with familiar spirits and the wizards, but when he himself could get answer "neither by dreams, nor by Urim, nor by prophets," he was able to find a witch at Endor. Manasseh (2. Chron. 33:6) again introduced all these practices at the very temple itself. Josiah soon after endeavored to purge the land of all such "abominations that were spied in the land of Judah and in Jerusalem," and still Ezra much later complains that "the people of Israel, and the priests, and the Levites, have not separated themselves from the people of the lands, doing according to their abominations, even of the Canaanites, the Hittites, the Perizzites, the Jebusites, the Ammonites, the Egyptians and the Amorites." (Ezra 9:1.)

Hebrew Tradition. Aside from the rather indirect evidence as to healing practices in the Old Testament and later times, the Talmud, Cabala and other traditional writings give some insight into the ideas that are believed to have been current in those days. Tradition has it that Adam, during his last illness,

[1]Ezek. 8:17, Hosea 4:12, Isa. 2:6, 47:9, 12-13, Micah 5:12.

sent Eve and his son Seth to the Garden of Eden to procure some of the oil of healing which he had learned to use in the treatment of seventy-two diseases that his sin had brought upon him. Noah also figures in tradition as a man who possessed many wonderful powers among which was a knowledge of the healing art.

Coming to more distinctly Hebrew names: Abraham, the Chaldean father of the race, is credited with the discovery of astronomy, the invention of the alphabet, the knowledge of magic and other secret lore; and says Kohler, "it is related that he wore a pearl or precious stone of magic power on his neck, wherewith he healed the sick" (49, p. 87). The knowledge of this magic power, we are told in the same connection, is supposed to have been revealed to the sons of his wife Keturah. Joseph employed physicians and may be supposed to have had considerable knowledge of Egyptian medicine, as Moses, the lawgiver, undoubtedly had.

Solomon's is perhaps the greatest Hebrew name in the traditional history of medicine. Josephus (p. 593) in his account of Solomon's wisdom tells us that "God enabled him to learn that skill which expels demons . . . and he left him the mode of using exorcism by which they drive away demons so that they never return. And this method is prevalent unto this day, for I have seen a certain man of my own country, whose name was Eleasar, releasing people that were demoniacal in the presence of Vespasian . . . the manner of the cure was as follows: He put a ring that had a root, of one of those sorts mentioned by Solomon, to the nostrils of the demoniac, after which he drew the demon out through his nostrils, and when the man fell down at once, he adjured him (the demon) to return into him no more, making still mention of Solomon and reciting the incantations which he composed." The lost book "Wisdom of Solomon" is said to have been a book of magic prescriptions, formulæ, and incantations for the cure of all kinds of disease and was for centuries in great vogue among the people (17, p. 97). Another tradition states that "Solomon possessed power over demons by virtue of a talisman, which consisted of a signet ring of brass, upon which was engraved the most great name of God" (49, IV, p. 521). The Musselmans still revere him as the greatest of all physicians and no doubt many of the magical means of cure still used in the East had their place, if not their origin, in this now lost book.

The use of amulets has a history of several thousand years with the Hebrews, and it is believed that with them as with primitive peoples to-day all ornaments were originally amulets, charms or religious symbols possessing supposedly real virtues. During the Rabbinical period (first to sixth centuries) they

were used very extensively, especially by women and children, but medical men are also known to have made use of them. Those inscribed with scripture texts, names and especially the mystic name of God were most highly prized. A peculiar design of a star in a circle with numerous sacred names inscribed upon it is said to have been designed by Adam. The Creator himself was believed to have made use of such means to perform his mighty works.

Although it is very difficult to know at what time such traditions as these sprang up, and although it is impossible to say just what were the facts if any which gave them credence, they are nevertheless of some value as evidence that in quite distant times many strange practices were made use of in the treatment of disease, almost all of which seem to lend credence to the view that underlying them was the disease demon theory and a belief in magic as the effectual means of cure.

New Testament Miracles. The prophets of the old dispensation looked for a Messiah who should be the healer of His people and those who had eyes to see could not fail to recognize such an one in the person of the Great Physician. In Him we find the culmination of miraculous power. When we compare the long stretch of centuries covered by the Old Testament record, its few scattering miracles centering about a few strong personalities, with the three short years of Jesus' active work crowded full of miraculous doings, we can form some estimate of the importance and frequency of these manifestations of a great personality. In short we have here the greatest epoch in the history of the miraculous. The miracles of other peoples and even those of the prophets of Israel seem on the whole a little trifling and insignificant in comparison. While many of the conceptions of disease and its cure which prevailed under the old order of things were still prevalent at the time of Jesus, there are certain marked differences that are worth noting.

In Old Testament times, as we have seen, the traces of a belief in evil spirits as a cause of disease are few, indefinite, and of a primitive type; in the New Testament we find a perfectly developed demonology clearly stated and generally accepted. The similarity between the Persian and Chaldean demonology and that of the Jews has often been noted and many critics have attributed the likeness to influences exerted on the Jews in captivity. The trend of present day criticism, however, is to make less of the influence of outside nations and to recognize that the Jews being a people of like race and temperament with the races about them, living in a similar environment, and possessing, as we have seen, the germs of such an idea, needed only the rigor of their Judaistic monotheism to complete

the evolution of a demonology such as we find in New Testament and subsequent times. However that may have been, there is no mistaking the fact that a radical change of view has taken place and that Satan and his emissaries play an exceedingly important rôle in disease from this time on. How far Jesus shared the current views it is impossible to know but in His healing work He proceeded as though the prevailing explanation of the phenomena of demon possession were the true one. On the other hand there is no very strong proof that He ever considered disease a punishment for sin and on one occasion at least He is quoted as having clearly opposed this old Hebrew conception as contrary to the spirit of His religion.

Another feature which distinguishes the new from the old dispensation is the preponderance of miracles of healing. With the prophets and seers of the olden time cosmic miracles were more numerous than healing miracles. In New Testament times the reverse is true. Taking as a basis the number of occasions on which Jesus exercised miracle working power we find that more than 72 per cent. of them were of healing. If we take into account the many expressions such as: He healed "all that were sick", "all that were diseased", "them that were possessed with demons", "them that had need of healing", "many", "multitudes", "all manner of diseases", and others of like import the relative number of cosmic miracles accredited to Jesus sinks into comparative insignificance. His statement to the disciples that by faith they might remove mountains may be taken as evidencing His belief in their ability to perform cosmic miracles, but so far as we are informed only a few of them ever performed even miracles of healing.

Both Jesus and some of His disciples are said to have cured all manner of disease, and so far as the record goes Jesus never failed in any attempt to cure although the disciples did in at least one case. Among the recorded cures of Jesus where details are given the common diseases rank as to numbers cured in the following order: leprosy, demon possession, blindness with several others in about equal numbers. In the general statements the writers speak of the sick, diseased, tormented, possessed with demons, lunatic, palsied, leprous, blind, deaf, dumb, lame, maimed, halt, and those afflicted with the plague as having been cured and the dead raised to life by the Great Physician.

The methods used by all the miracle workers of the New Testament were not radically different from those with which we have already become familiar among other peoples. There was no hesitancy in making use of such traditional means as

saliva, the touch of the hand of the wonder worker, baths; the Levitical regulations were observed in the healing of lepers; Peter's shadow cured any sick upon which it chanced to fall; handkerchiefs or aprons rendered potent by contact with the body of Paul cured diseases and expelled demons (Acts 19:12); the WORD of power was used by all. Exorcism, here as with all other peoples of antiquity, was the almost universal means for the casting out of evil spirits. As in Moses's time it was admitted that the difference between the wonders of the Egyptian magicians and those performed by the Lord through Moses was only one of degree, demonstrating the greater power of the true God, so Jesus seems to have believed that others were able to use the power of exorcism. To the Pharisees He said: (Math. 12:27) "If I by Beelzebub cast out devils, by whom do your children cast them out?" At another time He rebuked the disciples for forbidding one who followed not with them to cast out evil spirits in His name. The almost universal requirement which was insisted upon as a condition of cure was the faith of the patient. Where this was weak He strengthened it and on at least one occasion He intimated that He would not, or perhaps could not, do anything without it. Unbelievers were sometimes excluded, certain traditional methods were used, in every way the patient was stimulated to do all he could for himself, and it should be noted that whether purposely or not the laws of mental medicine as we now know them were conformed to in almost every detail. For a detailed development of this point one may consult Hudson (44).

Some modern critics make much of the genetic order of Jesus' miracles, seeking thereby to show that not only did His own feeling of His power grow by exercise, but that the miracles which He performed make increasing demands upon our faith. So, too, they maintain that the publicity with which He did His work increases as His ministry advances. In His earlier miracles they find that the initiative was usually taken by the patient, whereas later from pity and a sense of duty He often relieved those who had not sought His aid. The nature of the records, their meagreness and the conditions under which they were written make it difficult to maintain this point satisfactorily, and if it were true that the miracles manifested increasing power it might be accounted for by the increasing faith of the people as they became more acquainted with His work. The genetic view is not an unreasonable one, however, and in a psychological study of the life of Jesus it yields some very helpful conceptions. It is beyond our purpose to pursue such a discussion in detail.

The fact of most significance for our study is the great power of personality manifested in Jesus. Even the extremists in

criticism admit that no life has ever had crowded into three brief years such an amount of wise teaching, deep insight into life, and such manifestations of the power of personality as this life. It is no disparagement whatever to this life that the mighty works which were done in it do not differ radically from those of other great minds. It is enough to know that in it were revealed depths of insight into the great fundamental laws of life the significance of which we have scarcely glimpsed as yet. Compared with the therapeutic methods of His time, His methods were simplicity itself. They were, in short, psychic and were based on an understanding of the ultimate relation between mind and body such as that toward which medical science is now more and more tending. The miracle workers among His followers were Peter and Paul, the two strongest personalities of apostolic times and the two men who understood most fully the import of Jesus' life and teaching.

Christian Miracles of Healing

Such eminent Jewish authorities as Kohler, Broydè, Blau[1] and others are of the opinion that the Essenes a Jewish order of monks who pretended to exercise great miraculous powers through the magic spell of the Holy Name, were in a sense the predecessors of the Christian miracle workers and did much to prepare an atmosphere favorable to the acceptance of the wonder working power of the name of Jesus as used by the apostles. They also maintain that rabbinical literature made less of the miraclous than did the literature and practice of early Christianity, and that cures by exorcism and other miraculous means were most common in Judeo-Christian circles. The belief in such powers they consider a common characteristic of both pagan and Jew at the beginning of the Christian era.

During apostolic times miraculous powers were in evidence but became less prevalent at the close of this period. Beginning with the second century the rôle of the miraculous again becomes important and continues to be increasingly so till recent times. In many quarters even an extreme belief in the miraculous is still maintained as a true tenet of Christian faith historically established and not to be altered in any particular by the findings of present day science.

Brewer (16) has summed up in his recent "Dictionary of Miracles" some valuable and interesting data concerning the miracles of Roman Catholic saints. Beginning soon after apostolic times there are records of the miraculous powers of the saints in ever increasing numbers. At first these miracles

[1] For the opinion of these scholars see "The Jewish Encyclopedia," (49) vol. iv, p. 519; v, p. 230 and 306; viii, p. 607.

were wrought by the saint in person but later the same powers were credited to their relics, tombs, and shrines. The hagiography of the church teems with the miraculous all through the middle ages. There are several notable saints any one of whom, if we are to believe the record, performed miracles the briefest record of which would fill a good sized volume.

In all of these miracles there is a close resemblance to the Bible records, the example of Jesus and His early disciples being followed both as regards methods and language employed. The demands made upon our credulity are, however, so much greater than those of the Bible records that this in itself discredits many of the accounts. For example the fact that raising of the dead is one of the most common of miracles and the fact that bodies that had been completely dismembered are said to have been restored, that still born children and even roast pullets, partridges and the like could be restored to life tends to discredit the whole record of the miraculous during the middle ages. The same diseases are spoken of as those already mentioned in the preceding section.

From the fourth century on the sign of the cross became one of the most potent means of effecting cures. It was and still is regarded as a charm usually sufficient in itself to cure, but many times its use is accompanied by prayer, the name of Jesus, holy water or oil, a kiss or touch and the like. Beginning about the sixth century the crucifix was used in the same way.

A few illustrations of methods used by the saints must suffice to show how closely these were copied from Bible accounts. In raising the dead the saints either stretched themselves upon the body as did Elijah or taking the person by the hand called him by name or commanded him to arise. The use of saliva or holy water was the common means of restoring sight; pilgrimages to the tombs of dead saints were the resort of cripples; exorcism was the usual procedure in casting out demons; touch in the cure of king's evil. Some originality may be granted to the saint who exorcised a demon by drawing its picture and then burning it. The mere sight of a saint caused one demon to flee from the ear of the possessed in the shape of a mouse. Profession of faith and baptism were frequent means of cure for disease. Exorcism was long a part of the formula of baptism in the Catholic church as well as the use of saliva (16, p. 295). St. Francis (1416-1507) we are told used saliva and the sign of the cross in a remarkable miracle performed on a child born without eyes or mouth. The record says: (16, p. 232) "St. Francis marked with his spittle the place where these features ought to have been, and then making the sign of the cross the infant became possessed of two

brilliant eyes and a model mouth." Several of the saints are said to have stayed the plague, and Pope Leo IX (16, p. 264) gave wine in which relics had been steeped to those who were afflicted and it is said that "all who drank in faith recovered" although we are not told how many were thus cured. As has already been stated the plague was regarded by many besides the Christians as a stroke of divine displeasure, but Procopius's description of it shows so well the immediate agency believed by people of his time to be its cause that I must quote. He says: (16, p. 438) "the manner of attack was this: visions of spirits in all sorts of human shapes were seen, and these spirits struck with a blow the victim who was forthwith taken ill. At first men tried to turn away the demons by uttering holy names and hallowing themselves as best they could; but they gained nothing by so doing . . . . . not a few saw the phantom demon in their dreams at night; it stood over them and struck them, and they were numbered among the dead."

The belief in demon posession, as we shall see, has not died out, but during the middle ages and early renaissance centuries it played a much more important rôle than now. Some things in regard to the treatment of such cases have already been noted, but the following quotation from a book entitled "A Club for Exorcising Demoniacs," written by Mengus in 1600, throws so much light on the methods of that time that we cannot afford to omit it. "If after mass has been signed with five crosses, sprinkled with holy water, and there have been invocated over her (the possessed) the name of the Father, Sonne, and Holy Ghost, the devill still shews himselfe refractarie, and will neither depart, nor tell his name,—then you must come upon him with as many nicknames as you can possibly devise, and thou shalt say: 'Heare thou sencelesse, false, and lewd spirit, maister of devills, miserable creature, defrauder of souls, captaine of heretiques, father of lyes, bestial ninnie, drunkard, infernal thiefe, wicked serpent, ravening wolfe, leane hungerbitten son, seely beast, truculent beast, cruell beast, bloody beast, beast of all beasts most bestiall, Acherontall spirit, smoakie spirit, Tartareous spirit, and so on, I command thee to tell me thy name, and to depart hence into thyne own place'" (16, p. 103). As will readily be seen, these directions combine several of the most potent means known to the Christian exorcist of the dark ages: the mass, sign of the cross, holy water, the use of holy names, knowledge of the demon's name, and abusive language. All these means, singly and together, were many times used and it seems quite probable that their effectiveness was thought to follow about the order in which they are here mentioned.

King's Evil. In this connection some mention must be made

of the miracles performed by the French and English kings. The early development of the idea that by a sort of divine right the power to cure scrofula, or as it was at that time called, "King's Evil", was conferred upon the sovereign it is impossible now to trace. It seems certain (16, p. 306) that the French kings enjoyed the privilege long before those of England, and tradition says that it was first a gift to Clovis at his baptism in 496 A. D. Another persistent legend is that it was bestowed as a gift by St. Marcone in the sixth century. However this may be, we find that many of the early French kings made pilgrimages to Corbeny, where the body of this saint reposed, in order to have his skull placed reverently in their hands by the monks. On the day following this ceremony they were ready to banish with a touch that disease, "*pour la guérison desquels Dieu a accordé aux rois de France une grace singulière.*" Most of the French kings used the sign of the cross saying at the same time "*Le roi te touche, Dieu te guerit.*" This divine prerogative was exercised by the French kings from the time of Louis le Gros (1108-1137) with few exceptions until 1825 when Charles X effected many cures. Some were deprived of the right, it is said, because of evil life, but rather out of harmony with this is the fact that some of the most notoriously immoral of the kings exercised it with success. Phillippe VI (1328-1350) is said to have cured 14,000; Louis XII (1498-1515) "reconciled himself to God seven times a year by confession" and after each confession touched any one who had need of healing; Henry IV (1589-1610) touched and healed above 15,000 persons a year, according to the king's physician.

In England the first cures are accorded to Edward the Confessor who, it is thought, may have learned the practice from his French contemporaries. His method was his own. Brewer finds that "the king sent for a basin of water and dipping his fingers therein he frequently touched the parts affected every now and then forming with the tip of his finger the mark of the cross. The persons to be touched were selected by the king's surgeon and the number went on increasing every year." (p. 306). Edward I gave a gold or silver touch piece to those he cured; Elizabeth discontinued the use of the sign of the cross for fifteen years; Charles II is said to have touched 100,000 persons on his accession and more than 4,000 yearly and yet "in his reign more died of scrofula than in any other;" Anne touched some 200 in 1714 among whom was the distinguished Samuel Johnson; George I discontinued the practice in 1714 but the formula for "The office of touching" did not disappear from the "Common Prayer Book" until 1719 and pretenders continued to practise it as late as 1745. Black (9, p. 43) tells

us that "In 1838, failing the royal touch, a few crowns and half-crowns bearing the effigy of Charles I were still used in the Shetland Islands as remedies for the evil."

Demonology

The subject of demonology is a study in itself, but its prominence in the miracles of healing in biblical times and since, make it necessary to note the evolution of the idea very briefly. There can be little doubt that the demonology of the early Hebrew period was a development from some simple form such as those we have found among the primitive races. From a conception of spirits devoid of moral character, good and bad spirits came to be differentiated. From the classes of good and evil spirits it was possible in time to derive the ideas of gods and devils which came much later in history, by a gradual subsumption of the powers of all the good spirits under one supreme spirit to get the idea of the God of monotheism, and by a similar process the idea of monodemonism with its arch fiend, the Devil or Satan, under whose dominion all the evil spirits of the universe live and act. Much of this evolution had been accomplished before Jewish times and it must be regarded as the necessary accompaniment of a rigorous monotheism. It is possible to note within the sacred record itself the evolution of the Satan idea in proportion as the evils of life were attributed less and less to God's judgments until finally they are laid almost wholly at the door of Satan and his emissaries.

The belief in the miraculous had not a little to do in this evolution. As we have shown, miraculous events were, as now, by no means confined to the chosen people, but in accounting for the wonders worked by others it was common to say "the gods of the heathen are devils," thus attributing their success to Satanic rather than divine power. Thus from very early times the misfortunes, diseases, and pains of the devout have been attributed to the agency of the Evil One, but at the beginning of the Christian era and from that time on a certain sort of mental disease known as "demonic possession" has been especially attributed to Satanic influence. It is this class that interests us most, not only because of its prominence in the miraculous cures of all the Christian centuries, but particularly because of the psychological phenomena it presents.

Demonic Possession in China. Perhaps no better illustration of what "demonic possession" is and always has been, is to be found than the cases of this phenomenon that may be observed in China to-day. In a recent book (65) Dr. Nevins describes in detail many cases which resemble in almost every particular those described in the New Testament, and maintains that they are inexplicable except as the actual influence of evil spirits.

He cites other modern observers in India, Japan, and Europe who have observed the same phenomena. Bishop Calloway and Brough Smith have seen many cases, in Natal and Australia respectively. (15, p. 52.)

Although the attendant phenomena vary widely there is a general similarity among all races. Some of those affected are wild and unmanageable, leap, and toss their arms about; others are more calm; some entirely unconscious while visibly possessed. The personal appearance is nearly always changed; in some there is palpitation, peculiar contractions, foaming. In nearly every case a second personality appears which personates a god, genii, the spirit of a deceased relative, or some animal. The first symptoms of the disease often occur in dreams and many times a fit of anger or grief is the first sign.

In most cases the "demon" comes in spite of the most violent opposition on the part of the person, but there are those who voluntarily invoke the spirit's presence in order through its power to make revelations by clairvoyance, clairaudience, or by a Chinese variety of planchette. Numerous other powers are claimed for the possessed such as speaking with tongues or in poetic form, singing, when otherwise they could not, and evidencing unusual physical strength. In some cases they are very destructive; they rob, steal, curse food and wells, put filth in eatables, and cause the money of the household to disappear; while if they are worshipped and propitiated all evil manifestations disappear and the family receive unusual favors instead.

The Chinese system of treating possession is in accord with their beliefs regarding it. A priest is called in who makes use of one or several of the following means: sacrifice, chants from the sacred books, prayer, offerings of money, begging or exorcism, magic spells, incantations; or by pinching, sticking with needles, by the use of peach or willow branches, charmed water and other similar means he drives out the spirit and confines it. If the priest-doctor fails they resort to spiritism and all its attendant phenomena of rappings, table tipping, planchette writing; and revelations of suitable charms or remedies to be used are as familiar to them as to our spirit mediums and our Indian medicine men. Confucianists, Taoists and Buddhists alike make use of such means. Of recent years Christian converts have been most successful in casting out these spirits by prayer and in the name of Jesus. In many cases a profession of faith is said to have been sufficient to relieve the sufferer of all further trouble. Space forbids the quoting of any of the numerous detailed descriptions of individual cases given by Nevins, interesting as they are as data for a study of comparative psychology and pathology. But one may say that

almost every phase of the so-called "demon" possession of China, as it appears in the descriptions of Dr. Nevins, can be paralleled in any large institution for the insane. Any one who has had experience even in clinical demonstrations with such patients must at once admit the similarity. The periodic recurrence of attacks, the phenomena of double personality, sudden outbreaks of mania and as sudden returns to apparent normality, changes in voice, peculiar losses of control over the natural movements, or variations by habit or fixed ideas of functions naturally reflex, as breathing, etc., peculiar claims to and even real possession of unusual powers,—all these and many more of the manifestations we find repeated in every insane hospital. The differences are practically nil except those due to religious beliefs, superstitions, and race characteristics shown equally well in normal individuals. A more careful study of demonology in a comparative way by men of anthropological and psychological training will no doubt make a valuable contribution to our knowledge of the human mind and its variation under environment, education, and the influence of dominating religious and superstitious ideas, but there can be no question that it will be termed simple insanity.

Some Modern Miracles

St. Anne de Beaupré. For a modern illustration of the class of miracles performed during the middle ages one need not even cross the Atlantic. Not far from the city of Quebec there stands to-day a shrine at which we are told may be seen evidences of the miraculous almost any time. Long ago a few Breton sailors who believed themselves lost in a storm vowed to St. Anne that if she would deliver them they would build a chapel at the spot at which their boat touched land. They were saved, and true to their promise built a modest wooden chapel. In 1660 the chapel was rebuilt on another site and again in 1787. The foundation of the present structure was laid in 1872, and was completed in 1876 at a cost of nearly $200,000. About the year 1670 a relic of the saint was brought from the chapter of Carcassonne. We are told (*Cath. W. 36 p. 87*) that: "this relic is in fact a portion of the saint's finger and is vouched for by the cathedral chapter of Carcassonne, by Mgr. de Laval," etc. In 1877 another relic was brought from Rome, many valuable gifts were sent by patrons from various countries, some of whom belong to the royalty of France and Austria, and the shrine became so famous that on May 7, 1876, Pope Pius IX declared St. Anne patroness of the province of Quebec. Relics of other saints are also now to be found there and (*op. cit.*, p. 88) "the walls and sanctuary are fairly covered

with crutches, hearts of gold and silver, and the like, each one telling of a belief in some cure obtained, or petition heard."

The popularity of this shrine does not seem to grow less but rather greater as the years pass. Pilgrimages are made at all times of the year and during the summer months the sick and those who have been cured come by trainloads to be cured or to render thanks for favors already received as the case may be, and the ancient prayer "*Sainte Anne, Mère de la Vierge-Marie, priez pour nous*" is on every tongue. The records for the year ending Oct., 1903, show that during the year some 168,000 pilgrims visited Beaupré, 1,250 of them coming from various parts of the United States. A study of several copies of the "*Annales de la Bonne Sainte Anne de Beaupré*" has furnished some information as to this interesting chapel as it is now. This monthly publication given up to recording the miraculous cures which take place at the shrine and elsewhere through the help of St. Anne, and to some other matters of a more general nature, offers to its subscribers participation in the merits of the prayers, masses, communions, mortifications, works, and occupations of the fathers Redemptoristes of St. Anne de Beaupré, keepers of the venerable Sanctuary.

In the "*Annales*" we find recorded each month from one hundred and fifty to two hundred or more cures besides numerous material favors such as employment, protection on journeys, conversions and other spiritual and temporal blessings. Some are recorded with some detail so that it is possible to form an idea of the general nature of the cures here effected as well as the means used to this end. Among the most common means used are prayers to St. Anne, at the shrine if possible but often at the suppliant's home; pilgrimages to the shrine; promises to publish the fact of cure in the "*Annales*"; promise to subscribe for the same; the use of medals of St. Anne as a charm; promises to break bad habits; application of an image of St. Anne or of holy oil brought from the shrine of Beaupré.

As an illustration of the nature of the cures effected and the unbounded faith of the petitioners we have selected a few of the more detailed cases from the January and February numbers of the "*Annales*" for 1904 which we present in translation from the French.

1. "Since January, 1902, I have suffered with a polypus of the nose and an ulcer of the jaw bone. I had submitted to two operations which have improved my condition without curing me. I continued to suffer. In July last I decided to put myself under the protection of the good St. Anne promising her to publish my cure. That moment there came about a sensible improvement. To-day I believe myself entirely cured and I thank my heavenly protectress for it."

2. "My little girl of two and one-half years had never walked. She was desperately weak. I commenced to pray to the good St.

Anne promising her to publish the fact in the "*Annales*" if she would make my child walk, and to subscribe for it the following year. Her grandmother made a pilgrimage to Beaupré and on her return she put a medallion of St. Anne around the neck of the child saying to her "a gift, you must walk". At the same instant the child, smiling, began to walk with a firm step. I am so happy that I do not know how to express my thanks."

3. "My husband was worn out with an affliction of mind which was about to impair his reason. The good St. Anne, invoked with confidence, has returned to him his serenity."

4. "For five years I have endured terrible suffering. Finally, I promised to make secretly the pilgrimage to Beaupré. The good St. Anne has given me enough strength to acquit myself of my promise. Since my return I have been very well. Thanks Oh Good Mother!"

5. "Last spring I had a grave sickness which brought me to the gates of death and which baffled the science of our regular physicians. I received the last rites and every one believed that I was going to die. My family commenced a "*neuvaine*" to the good St. Anne and to the blessed Gerard Majella. Heaven has yielded. I am cured of the disease which was about to take my life. It only remains that I make my acknowledgment and publish this favor according to the promise I had made."

6. "For ten years my wife suffered from a painful infirmity. I promised St. Anne that if she would cure her I would abstain from all intoxicating drinks. To-day I am happy and publicly thank the good St. Anne, first for the complete cure of my wife obtained in a few days after my promise, then for having given me grace to keep faithfully my temperance promise."

7. "I am happy to announce to you that at present I walk easily without the aid of my cane. After my return from the sanctuary of St. Anne de Beaupré during the summer, I have been able to go to mass for the first time in four years. I have made already four pilgrimages to the sanctuary of St. Anne and I propose to make a fifth as an act of gratitude and to carry my cane in order to lay it at the feet of our benevolent patroness. Praying you to join me in thanking the good St. Anne," etc.

In just how far the very primitive conceptions of disease are prevalent among the devotees who visit the shrine of St. Anne it would be difficult to say. But whether or not the primitive view of the cause is prevalent, the idea of supernatural means of cure certainly varies little from that prevalent in all ages and is evidence of the persistence of a method of procedure long after the idea which gave it origin has been more or less discredited.

Shakerism. A recent historical sketch of the society originally called the "Shaking Quakers" presents some facts which are of interest to our study. This society was formed in 1747 near Manchester, England. It's most famous member was Ann Lee (Stanley) more familiarly known as "Mother Ann." She was born at Manchester in 1736. Her biographers say that (89, p. 15) "as a child Ann was serious and thoughtful, subject to strong religious impressions and given to reverie and visions." Her child life was not that of the freedom and

happiness normal to childhood, but, on the contrary, she lived a life apart and gave herself over to extreme and exaggerated religious experiences.

She early felt a strong aversion to marriage, but the customs of her time required her to marry against her wishes. She became a member of the Shaker society in 1758 when 22 years of age. She seemed to feel laid upon her the sins of the whole world, and repeatedly, through a period of nine years, there were times when she would spend her days at work and her nights at prayer until her body wasted away and perspiration as drops of blood pressed through her skin. It was at such extremities that her "visions" and "revelations" came. Some of these "revelations" have become a part of the doctrine of the Society. Those most fundamental and charasteristic are: 1. The duality of Deity, God both Father and Mother; one in essence . . . . two natures co-equal in Deity. 2. The secret of man's sin, the cause of his fall is the premature and self-indulgent use of the sexual function.

She felt that it was necessary that the Christ Spirit should come again in the form of woman to complete the revelation of God to humanity and she was the woman, anointed as she believed by the hand of Jesus himself, the second visible Head, in whom dwelt the Divine Mother. Very naturally, then, we should expect to hear that "about this humble, unlettered woman centered some of the most remarkable spiritual phenomena the world has seen . . . electric streams from Deity using her as a transmitter of spiritual force." (89, p. 15.)

According to their own claims Shakerism is the parent of modern spiritualism. At any rate spirit manifestations, prophetic utterances, phenomenal occurrences, revelations, and miraculous healings have been common throughout their history. Quoting again from "Mother Ann's" biographers (89, p. 353): "Numerous instances are certified to, by those who personally knew 'Mother Ann' and the Elders, where a word or a touch from her or from them had released from suffering, cured disease and restored health and strength . . . among them are cases of lameness, hip disease, consumption, acute dyspepsia and stomach troubles, exhaustion, obsession, dislocation of bones, glandular affections and many more."

There seems to be little or nothing here to distinguish the cures mentioned from those of other forms of faith cure. We have dwelt thus fully upon this movement only because it is somewhat less well known than many of the modern movements of this nature; because it bears some theological resemblances to Christian Science and is said to have furnished some of its doctrines; and because it furnishes one more illustration of the

sort of religious expression that accompanies many of our modern mental healing cults.

Current Survivals of Old Superstitions

We have noted somewhat in detail the elements of the miraculous in primitive medicine and have seen how, as the race becomes more civilized the form in which these elements appear changes from extremely crude to more refined and intellectual types. With the beginning of the scientific age many of the superstitions of primitive life were shattered; but the human mind by no means disconcerted by this fact simply adjusted itself to the situation by the invention of new means for the exercise of its faculty of credulity, or continued to hold its former beliefs in spite of contradictions. While modern scientific thought has dislodged much of the old primitive thought, students of anthropology and folk-lore in recent years have revealed to us some startling facts regarding the persistence of such beliefs. Even in the midst of highly civilized communities, in our own country for example, are still to be found many of the superstitions of primitive peoples, not merely treasured up in memory as tales of a past generation, but used and believed in as sincerely and thoroughly as at any previous age.

The fact that medical science makes use of many plant and mineral substances, and surrounds their use with a measure of secrecy and mystery, has perhaps contributed to the retention of very much of the plant lore that has been accumulating for centuries. Such men as Folkard (36) and Dyer (27), and in America Mrs. Bergen (6), have gathered and put into accessible form the immense folk-lore of plants. The former mentions the names of no less than 1,400 plants that have been in many ages endowed with remarkable powers as charms, amulets, counter charms, means of divination, etc. As medicines the virtues of many have been extolled far beyond and often even in direct opposition to their known qualities. These same superstitions are all about us in a more or less definite form as is shown by Mrs. Bergen's (5) studies in the current folk-lore of America in which one finds such statements as the following: "In a town fifteen miles from Boston, the teacher has advised the pupils to wear nutmegs about the neck to prevent cold sores. Feb., 1892" (p. 100). The same remedy was employed for the two-year-old daughter of a New Hampshire legislator in 1893. In Maryland the belief has some currency that "biliousness may be cured by boring three holes in a carefully selected tree, and walking three times around it, saying 'Go away bilious!'" (5)

The same facts with regard to animal lore have been found

by Jühling (51) in Germany and Mrs. Bergen (6) in our own country. The former mentions no less than 115 species and varieties of animals made use of in German folk-medicine alone and records the methods of employing their flesh, blood, etc., in actual practice at the present time. Many of these accounts present a picture dark indeed to one unaccustomed to noting the things upon which common humanity places its reliance in time of dire necessity. To give a single example of an animal remedy current in Labrador and in somewhat altered form in Indiana and Illinois. "Three lice taken in jelly nine days running, or put on buttered bread, will cure the yellow jaundice." (6, p. 69.) In the introduction of Jühling's work (51) it is stated that whereas in the accepted pharmacopœia of Germany at present only 13 remedies of animal origin are mentioned, even as lately as the time of the Thirty Years' War the "*Dresden Pharmacopœ*" contained 190. Newell says in the introduction to Mrs. Bergen's work (6, p. 6) "Michael Ettmüller, in his "*Opera Medica*" (1708), devoted nine folio pages to medical preparations from the human body and its excreta, of which those obtained from hair, nails, sweat and ear wax are the least filthy." When we find many absurd animal remedies used by the medical profession even as late as the middle of the eighteenth century it is not so surprising to find them used to-day among the unenlightened populace who as a rule must depend on household remedies. A comparative study of ancient and modern scientific medicine shows that as the science advances the number of efficacious remedies from both plant and animal world decreases rather than increases and that many remedies found the beginning of their use in superstition.

Perhaps as good an example as can be given of the survival in the midst of civilization of almost all features of primitive medicine is to be had in the old book "*The Long Hidden Friend*" (43) recently re-published in the *Journal of American Folk-lore* (1904). This strange book was published by John G. Hohmann in 1819 and has been ever since used among the Pennsylvania Germans of eastern Pennsylvania by what are known as "hex-doctors" (*hexe* a witch) whose business it is to overcome the spells of witches on man and beast. The book contains charms, incantations, prayers, and symbols and its extensive use throughout whole communities and almost counties is sufficient witness that the days of witchcraft are by no means gone even in our civilized communities.

Abbott finds that the evil eye is still feared in West England (1, p. 139); that in Macedonia "sorcery is expressly recognized by the Greek church as one of Satan's weapons, to be fought against by Christian means" (p. 143). As both the

Russian and Macedonian peasants considered disease the influence of evil spirits their treatment is "by purification with fire and water, and so the popular practice of physic is founded on a theory of fumigations, washings, and sprinklings attended by exorcisms of various kinds" (p. 223). Both Macedonians and Turks use as a remedy for diseases caused by "Spirits of the Air," for which they believe physicians can do nothing, verses from the Koran sewed up in leather (*Nuska*). "This prescription is either worn around the neck as a phylactery, or is burned and the patient is fumigated with the smoke thereof, or still better, it is washed in a bowl of water which is afterwards drunk by the patient" (p. 224). So, too, passages from the Bible written on the patient's neck or cheek, or water in which a leaf from the Bible has been soaked answer for exorcism.

The frequent appearance in systematic treatises on folk-medicine of prayers and spells Abbott considers strong evidence of the firm conviction that physical ailments are due to non-physical causes. Such a systematic treatise he found in MS. form among the Greeks of Macedonia. It is nameless, dateless, and incomplete, but appears to be the work of an eighteenth century scribe. It is in many ways comparable to "*The Long Hidden Friend*" of which we spoke above. Our authority (1, p. 240) says of it: "This extraordinary document —in tone and style so like parts of the Litany—affords a good illustration of the compromise by which Christianity has adopted pagan belief too firmly rooted to be swept away." What he says of this is true of all other traditional formulæ current in Christian countries. Christian names of Deity, saints, apostles, etc., are substituted for heathen deities and heroes, but otherwise the formulæ are identical. It is beyond the limits of this study to trace further the medical superstitions of this class current throughout the civilized world, and certainly what we have given is sufficiently extensive and representative to convince one of their prevalence. We have here simply an illustration of the fact that the evolution of man's ideas regarding the mysterious and unknown does not keep pace with his development along other lines. It is evidence also of the tenacity of those ideas which have to do with his physical and spiritual well being.

Present Day Cults. Christian Science, Dowieism, and the various schools of mental and "divine" healing have been so thoroughly and ably discussed by Goddard (38) and others that it seems unnecessary to add any detailed treatment of them to this already lengthy discussion. While the writer has made a careful study of these systems his aim so far as they are particularly concerned has been rather to confirm the con-

clusions of his predecessor in this field, and, giving him due credit, to use his conclusions in so far as they fit into a general and extensive study of the miraculous. Goddard has well shown the limits and possibilities of such systems; their relation to hypnotism; their dependence on the common principle of suggestion; and the irrelevancy of any of their distinctive features as the essential elements in their success, since all succeed about equally and in about the same fields. In other than a scientific age some of their accomplishments would be regarded as truly miraculous. They serve to attract that type of mind that does not easily give over a belief in the supernatural. They arose as a protest against a too materialistic conception of medicine and as a substitute for the cruder views supplanted by science. They mark a tendency of the day to evaluate more highly the mental element in man, a thing which psychology in a very different way is aiming to accomplish. Far from being discouraged by the fact that modern psychology has been unable as yet to make such peculiar movements impossible the psychologist should welcome their existence as furnishing a field for the study of religious, social and individual psychology unparalleled in the richness of its offers. This field is full of challenges to our science presenting as it does numerous unsolved problems in the nature of mind and its dependence upon physical, social, religious, moral, and spiritual influences.

The recent Emmanuel Movement is worthy of note in this connection because it has called renewed attention to the fact, and possibly the necessity, of a union of religious and spiritual with psychological and medical methods of treatment of disease. Our study of primitive medicine shows clearly a large religious element in all methods. The success of Christian Science, Dowieism, and kindred movements bears witness to the effectiveness of the appeal to the religious emotion made to centre about an organization and a place of meeting. The failure of some cults which make use of the religious appeal and the success of others with the same cases make plain the fact that not the same type of appeal is effective with all minds. As in primitive times, so now, while the underlying principle may be the same the outward manifestations vary greatly for different types of mind.

The Emmanuel Movement in its incipiency gave promise of being a happier and saner combination of medical, psychological, social, and spiritual methods than any that has yet appeared. In limiting its field of operation to that of functional nervous diseases it accepted the findings of science. It is to be hoped that maturer thought will rescue the movement from a too critical attitude toward medical science (91, p. 5, p. 52) to a legitimate and worthy endeavor to combine that which is

best in science with that which is best in religion in an attempt to alleviate the sufferings of humanity.

The whole tendency of our study is to emphasize the view of modern psychology that the human personality is a unit—physical and mental—and that in the treatment of disease one may perhaps no more neglect the social, moral, and religious nature of the patient than he may the physical. Such a suggestion has tremendous significance for the psychologist, the physician, the social worker, and the religious leader.

To consider it from the point of view of the physician alone it seems to urge, in addition to the appeal which the profession has adready made to the psychologist and the social worker, the necessity of a closer association with the religious worker. The freakish, foolish, unnecessary views of many modern cults would gain less currency if a better understanding and a closer co-operation could be established between the workers in the fields suggested.

Psychological Interpretations

As in primitive, so in modern healing systems, the healer is the centre of much of our psychological interest. One must attempt to realize in oneself the consciousness of both healer and patient as well as to retain at the same time the critical attitude of the observer, a task which it is needless to say is not easy.

The healer has always been necessary. Even the skilled physician hesitates to attempt to heal himself. His brother physician may use the same means, but they will be more effectual than if self-administered. In this appears the social nature of man and his dependence upon his fellows as well as upon higher powers. From our study of the medicine-man it is evident that if he is not already to some degree pathological (which may in this case mean super-sensitive mentally) he makes use of various means which tend to bring about an approximation, at least, to a psychopathic condition in which, because of his training and belief, by hallucinations, dreams and the like he feels his miraculous endowment come upon him. In each case of treatment he undertakes, somewhat the same procedure must be gone through before he is ready to attempt the cure. Two reasons for such procedure seem evident. The subjective one that thereby the confidence of the medicine-man in his own abilities is increased, for in this semi-pathological condition there is an exhilarating mental activity accompanied by a lessened physical feeling of limitation which he interprets as the indwelling of divine prerogatives which he may use. In the second place his actions and appearance in the meantime become so changed that the patient believes him to be what he

claims and gives his unbounded confidence—the chief element of success. The fact that his assumptions may be unfounded in no way affects his success so long as he secures the confidence of his patient and can make his suggestions effectual.

Making due allowance for changes which science, civilization, and higher types of religious thought have made, the successful healer, be he scientific physician, Christian Scientist, mental healer or what not, makes use of the same principles. Many medical men have been too slow to recognize the fact that the helpful suggestions radiating from a strong, hopeful, stimulating personality are many times a more important factor in the treatment of disease than are any of the medicines science has devised for their use. Consciously or unconsciously the successful healer of whatever school is a practical psychologist. A type of personality, with which by no means every one is endowed, is the prerequisite of success with functional nervous diseases especially.

A study of the personalities of the numerous healers who have succeeded notably under various systems reveals the following general facts. Such individuals are frequently found to have been in childhood nervous, excitable, hysterical, dreamers of dreams, seers of visions, subject to auditory and visual hallucinations. They are frequently persons who have had very precocious religious experiences; they have often little education; many are moody, self-centred, exclusive, solitary, meditative, and introspective. In adolescence and later life many have shown unusual interest in the phenomena of mesmerism, spiritualism, hypnotism, or other isms current in their day. In short they are personalities super-sensitive to mental influences both subjective and external, and for this reason they are able to influence strongly other minds possessing in the same or less degree the same characteristics. In short, all things combined to develop a personality that could make effectual suggestions favorable to mental and physical wellbeing. Barring the abnormalities and onesidedness of such persons, the physician should possess many of their mental traits.

There seems to us to be no doubt that the cures effected in primitive times by primitive means were in reality effected through the operation of the law of suggestion upon the mind of the patient. No fair-minded person acquainted with the facts can deny that cures could and must have been made by all the means enumerated in this study. Such results from such diverse and contradictory methods can only be made intelligible by an interpretation of them as the effect of mind, directed by suggestion, upon the body. Since spiritual agencies were for ages the sole discoverable cause of disease, the cures made under such a regimen could be only mind cures, barring

the occasional almost accidental use of real hygenic measures. We believe we have shown that the same was essentially true in the earlier civilizations of Egypt, Chaldea, Babylon, and Greece. The healing miracles of the Bible, excepting perhaps the raising of the dead, may easily fall under the head of mental healing brought about by an intense religious faith in the healer. In so far as cures have been made by saints, their relics, shrines, and the like; by the kings of France and England; by wonder working springs and wells; by many medical cure-alls and by other non-medical means familiar to all, the credit falls chiefly if not wholly to the effect of the patient's own mind upon his body according to the law of suggestion. Modern healing cults can do no more, except as they recognize the necessity of combining the use of this age-long method with rational hygenic and medical means. If we leave out of account all hygenic and medical means, the method of the shaman in so far as its operation upon the mind of the patient is concerned is as little different from that of the "divine" healer of to-day as that of the latter is from the method of the Christian Science healer.

The decided limitations to the cure of disease by suggestion alone seems to be no longer in doubt. On the other hand the medical science that is based solely upon the physiological action of medicines, if there ever was such a medical science, seems to be almost equally limited, as has been shown by writers both within and without the profession (85) and by the history of the science itself.

The leaders of thought and practice in the medical profession have long known and acknowledged the limits of their science. They have not been ignorant of the fact of the large mental element in the cause and cure of disease. The placing of hypnotic and suggestive therapeutics upon a scientific basis has been almost if not wholly the work of practical physicians. It is not by accident that the foremost authority in psychiatry—Kraepelin—combines in one person the best of training in psychological theory with a thorough knowledge of and practice in medicine, or that the French investigators who seem to be well on the way to the discovery of the real relation of the mind to the body combine in rare proportions these same qualifications. So, too, the minister who would follow in the footsteps of Dr. Worcester must have, as he has, a thorough grounding in psychology as well as practical theological and religious training. No merely formal theology, no smattering of popularized psychology will suffice to make him successful or keep him from fatal errors.

There can be little doubt that the failure of the rank and file of the medical profession to live fully up to their oppor-

tunities in the field of psychotherapeutics is in part accountable for the rise and spread of a type of healing cult which reflects little credit upon the intelligence of our people, but which has been a natural result of a new evaluation of the mental element in man brought about largely by the popularization of psychological thought. The church has been equally negligent of her duty as a moral and spiritual force working in harmony and in co-operation with the physician for all-round health. We desire to make the strongest possible appeal for a closer and more sympathetic relation between the sciences of medicine and psychology, and the practical, social, and spiritual forces of the church, each deferring to the other in its distinctive field, but all working together with mutual understanding to the common end of physical, moral, and spiritual health. Only in some such utopian scheme can superstition be uprooted, religion purified and restored to its own, the science of medicine kept from becoming too materialistic and so powerless in some cases and to a degree crippled in all; only by some such plan can the science of psychology be rescued from the danger of too much theorizing and put to work as the practical handmaid of all the other sciences of man.

Conclusions

At the risk of apparent dogmatism it seems necessary to state in a few brief sentences some of the conclusions which we believe this study warrants. In doing so some repetition will no doubt occur and some conclusions may be stated in positive form for the first time, it having been our purpose in part to present sufficient illustrations to make clear the conclusions now stated.

We believe that there have been and are miracle workers in every age, under the most diverse conditions of civilization and savagery, among all races and under every form of religion.

Almost all miracle workers and believers in miracles have attached religious significance to the wonders they have been able to perform because, being unable to explain the phenomena, they have attributed them to the activity of such supernatural agencies as they believed to exist.

By such wonders men have always been led to a contemplation of the mysterious and through such contemplation have been led to formulate many of their religious notions.

The rapid advance of physical sciences in recent years has rendered less and less prevalent the crude and often extremely irrational explanations of miracles common to primitive and even to civilized man. The advance of scientific psychology and scientific psychotherapy has done still more to rationalize our views by demonstrating the possibility of explaining sup-

posedly supernatural happenings on the basis of laws of physical and mental activity.

In spite of this fact, and because so much is still unknown especially in the field of mind, the belief in the supernatural still persists. This we believe to be due to the age-long tendency of the human mind to so react and to the inherent limitation and necessary finiteness of the human mind. It is possible that at least for ages yet religion without the supernatural will be for the masses an impossibility.

The field of the miraculous will always be a most hopeful and interesting field for science for it is always to be found just along the periphery of the field of science. New problems are always presented as old ones are solved.

Among the wonders of all peoples, miracles of healing have always held a pre-eminent place because of the close personal interest in the results and because problems in this field are more difficult and baffling than in any other.

It is now certain that those cures which have always seemed miraculous are the cures effected in large measure by the influence of the mind on the body. They have seemed miraculous because the laws under which they were effected were not understood.

It is now a well established fact that the cures of this nature are brought about in accordance with the law that the mind tends to translate into physical reaction any suggestion or idea which can be actively aroused and kept at the focus of attention. That this may be done the idea must seem reasonable and possible, and inhibiting and opposing ideas must be banished. In short, the mind must be made to give the idea free play.

It seems axiomatic that any system will succeed which can make this law operative for suggestions of physical, mental, and moral well-being. The ways in which this may be done vary as individuals always have and always will vary. In spite of the fact that all systems depend upon suggestion in some form as the means of making cures, it by no means follows that any one uniform or scientific system will be able to make suggestion effectual in all cases. We shall probably continue to have various mental healing cults so long as men think differently in the fields of philosophy or religion.

We may safely look for saner and more scientific views on the subject of mental healing but present tendencies indicate that we need not expect that the religious elements of faith in the efficacy of prayer, belief in the supernatural, and other deeply rooted instincts can or will be neglected as a means of making suggestions effectual. The appeal is not wholly nor chiefly to the mind acting in its most rational way but to those deeper, more fundamental activities, rooted in instincts, habits,

hereditary tendencies and the like, which are more far reaching in effect than anything in the rational activity of the individual mind.

We are forcibly impressed with the necessity of further careful and accurate study of the operation of the law of suggestion. We need far more data upon the conditions favoring and hindering the operation of the law. We have had much theorizing but as yet too little scientific study and experimentation in this promising field.

We are convinced that churchmen, physicians, and psychologists have all conceived of their functions and relations too narrowly and that they need to co-operate for mutual understanding and profit.

Finally, we believe that rightly conceived the laws of mental healing have a significance as hygienic measures equal to their usefulness as means of cure and that they are therefore of moral, spiritual, and pedagogical value as a means of establishing correct habits and activities in these fields.

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THE ABANDONMENT OF SENSATIONALISM IN PSYCHOLOGY[1]

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The basal purpose of this paper is to call attention to the advance made by present-day psychology on the sensationalism which persisted into the writings of the last decade. In 1893 Wundt, for example, was still designating the affection (*Gefühlston*, pleasantness or unpleasantness) as an 'attribute of sensation'.[2] To-day almost all psychologists agree in recognizing at least two classes of not further analyzable elements of consciousness—on the one hand, the sensational elements, on the other hand, the affective elements, pleasantness and unpleasantness. Stumpf's view, that sense-pleasantness and sense-unpleasantness are sensational, is the only notable exception to this agreement;[3] and recent criticism—that of Titchener,[4] Johnston,[5] and Meyer[6]—has so successfully assailed the doctrine that it need not here be considered.

But the effort to correct the crude and misleading simplicity of sensationalism has not stopped short at the admission of a new class of elements including merely pleasantness and unpleasantness. Explicitly or implicitly many psychologists now admit the occurrence of still other elemental kinds of consciousness. With the two important and distinct forms of this advance on sensationalism this paper specifically deals.

I

The first of these contemporary movements does not add to the number of classes of conscious elements, but it enlarges one of the classes already recognized. This is the theory of Wundt who includes in the class of the affections, or 'feelings', four elements (or rather classes of elements) co-ordinate with

[1] Read, by title, at the meeting of the American Psychological Association in Baltimore, December, 1908.

[2] "Physiologische Psychologie," 4te Aufl., 1893, Bd. I, 555.

[3] *Zeitschrift f. Phys. u. Psych.*, 1906, XLIV, 1 ff.; *Bericht über den II. Kongress f. experimentelle Psychologie*, 1907, 209 ff. It should be noted that Stumpf expressly restricts himself to the consideration of the sense-feelings (*die sinnlichen Gefühle*).

[4] "Lectures on Feeling and Attention," 1908, pp. 82 ff.

[5] Psychological Bulletin, V, 65 ff., 1908.

[6] Psychological Review, XV, 205 ff., 1908.

pleasantness and unpleasantness. These four are: tension and relaxation (Spannung-Lösung), excitement and quiescence (Erregung-Beruhigung).[1] Relaxation is opposed to tension and quiescence to excitement as pleasantness is opposed to unpleasantness, so that we have three pairs of opposites or, as Wundt calls them, 'dimensions' of feeling. The arguments for this view may be summarized as follows:

(a) The Wundtians point out that emotional states differ, according to common consent, not merely as pleasant and unpleasant, but also as exciting or quieting, straining or relaxing. Both melancholy and terror, for example, are unpleasant emotions, yet the first is quieting, or depressing, while the second is as clearly exciting.[2]

(b) This purely introspective argument is verified and supplemented by experiment. Alechsieff, whose experimental study is one of the best and most recent of those put forth by members of the Wundtian school,[3] stimulated his subjects in such wise as presumably to bring about emotional experiences, and recorded both pulse and breathing, and introspection. The introspective records first (1) clearly indicated the occurrence of straining and relaxing, exciting and depressing emotions; next (2), sometimes asserted the occurrence, in emotional experience, of elemental consciousness other than sensations, pleasantness and unpleasantness; finally (3) showed (in opposition to the results—later to be described—of Hayes) that either pleasantness or unpleasantness may occur in combination with any one of the four other 'feelings'. In other words, the records indicated that in pleasurable emotion subjects were sometimes in a state of tension, but sometimes relaxed, sometimes excited and sometimes depressed; and that in unpleasant emotion subjects were now relaxed, now strained, and now excited, again depressed. The objective results of these experiments are summarized by Alechsieff in the following scheme adapted from Wundt:[4]

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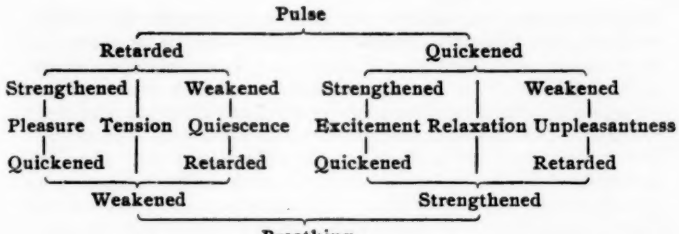
[1] "Physiologische Psychologie", 5te Ausg., 1902, II, pp. 284 ff. (*Cf.* "*Grundriss*", 1896, 1905; "Vorlesungen über die Menschen u. Thier Seele", 1897; "Gefühl und Bewusstseinsanlage", 1903).

'Quiescence' is Royce's synonym for 'Beruhigung'. Wundt has two equivalents for the term, namely '*Depression*' and '*Hemmung*'. For telling comment on the really divergent signification of the three terms, *cf.* Titchener, *op. cit.*, pp. 145 ff.

[2] *Cf.* Wundt, already cited; Alechsieff cited in the next note; J. Royce, "Outlines of Psychology", 1903, pp. 176 ff.; O. Vogt, *Zeitschr. f. Hypnotismus*, VIII, p. 212, 1899 (and other writers cited by Alechsieff and Titchener, *op. cit.*).

[3] "Die Grundformen der Gefühle", *Psychologische Studien*, 1907, III, pp. 156 ff.

[4] *Cf.* "Grundriss," 1904, § 7, 104.



The Wundtian conclusion from both sorts of evidence is the following: Experiences which are thus shown to be, on the one hand, introspectively elemental, distinct, and independently variable and, on the other hand, accompanied by clearly differentiated yet co-ordinated circulatory and respiratory phenomena are elements of consciousness belonging in a class together. Therefore tension-relaxation and excitement-quiescence form, with pleasantness-unpleasantness, the enlarged class of the 'feelings (*Gefühle*)'.

This form of advance upon the old sensationalism has, however, found little favor outside the rather narrow group of Wundt's fellow-workers and students. No one questions the occurrence of straining and relaxing, exciting and quieting emotions; but these distinctions, it is claimed, are incorrectly referred to the presence of elemental 'feelings'—strain, relaxation and the rest. The alleged elemental experiences are analyzable, rather, into non-affective elements. Against the Wundtian argumeuts from experiment it is urged by the critics that the outcome of experiment is very far from conclusive in Wundt's favor. Even experiments undertaken from the same theoretical standpoint as Alechsieff's issue in results of very conflicting nature—results which he himself can explain only by a supposition which is really a criticism of the experimental method, the supposition, namely, that the stimulus was too complex to rouse any discoverably elemental experiences.[1]

The experiments (earlier than Alechsieff's) carried on in the Cornell laboratory to test Wundt's theory[2] seem also to point

[1] *Cf.* Alechsieff, *op. cit.*, p. 175[2] *et al.*, for admission of the opposing results of experimental investigations of the breathing. For Alechsieff's attempts at explanation, *cf. op. cit.* p. 207; also pp. 180-200 where Alechsieff holds that psychologists have often confused with tension, with excitement, and even with attention, what is really a complex *Tätigkeitsgefühl* which includes both tension and excitement.

[2] "A Study of the Affective Qualities, I. The Tridimensional Theory of Feeling", *Amer. Jour. Psy.*, XVII, pp. 358 ff., 1906. For other criticism on the Wundtian theory, *cf.* Orth., "Gefühl und Bewusstseinsanlage, 1903; M. Kelchner, *Archiv*, V, pp. 107 ff.

to the opposite conclusion. In these experiments Hayes presents to his subjects "series of stimuli—tones or colors or rhythms— . . . two at a time. . . . Every member of the series is paired with every other member. The observer has to decide which of the two . . . is the more pleasant, the more unpleasant, the more exciting, the more depressing, and so on." The results are the following: (1) Tension was "described throughout in kinæsthetic terms." (2) Only judgments of pleasantness, unpleasantness, and tension were easily made. (3) (In opposition to Alechsieff's later results) the decisions 'exciting' and 'relaxing' agree with the decisions 'pleasant'; whereas the decisions 'quiescent' and 'straining' agreed with the decision 'unpleasant'. In other words, the alleged elements did not vary independently, and Titchener concludes that "since the pleasant-unpleasant dimension is not in dispute, we have a strong indication that that alone is fundamental." [1]

The impartial student of these counter investigations must admit that no decisive result, on either side, has as yet been experimentally established. Alechsieff challenges the presupposition of the Cornell experimenters that "it is impossible, through one and the same stimulus, to excite two different feeling-qualities"; [2] and Titchener admits that the "argument upon which the experiments rest is not demonstrably valid;" [3] but, on his side, Alechsieff by his own confession has to twist and pull the results of Lehmann, Brahn, and others in order to fit them into his tridimensional theory. The failure of experiment throws us back on introspection; and on this basis, again, in the opinion of the writer, neither the Wundtians nor their critics wholly make their point. On the one hand the critics are justified in the assertion that elemental affective elements—or feeling-elements strictly co-ordinate with pleasantness and unpleasantness—are not discovered in our emotional experience. Yet, on the other hand, the opponents of the theory, in their attempts to reduce all four of the new 'feelings' to organic sensations, ignore introspective testimony which has at least the face-value of their own. When Alechsieff's subjects protest [4] that they "feel the strain-sensations", but that they experience in addition to the strain sensations (and to the pleasantness or unpleasantness) a residuum which reduces neither to sensation nor to affection, there is no valid reason to discredit their testimony. But their 'residuum' will turn out, in the view of the writer, to be either identical with 'clearness' (the attention-element), or to belong to a third class of elemental experiences—a class co-ordinate with sensations and affections—that of relational experiences.

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[1] *Op. cit.*, pp. 161[2]-164[2] ff.
[2] *Op. cit.*, p. 208. [3] *Op. cit.*, p. 167[5]. [4] *Op. cit.*, p. 202.

The radical modification of Wundt's theory embodied in the last sentence is submitted for the consideration of his critics. Stated in more detail it involves the following teaching:

(1). 'Tension' is reducible to attention, or clearness, plus the organic sensations characteristic of attention.

The significance of this assertion varies, of course, according to one's doctrine of attention. If one follow Professor Titchener in the teaching that attention, or clearness, is itself sensational—in other words, that one may attend to sensations only—then we have here no enlargement of the traditional list of elements. But, in the view of the writer, Titchener's teaching cannot be maintained. He himself is at pains to admit that it is opposed to the view of several psychologists—he names Sully, Meumann, Saxinger[1]—who hold that unsensational contents may be attended to. The doctrine seems, indeed, inconsistent with Titchener's own doctrine: that introspection consists simply in attention to phenomena. For, as Titchener unequivocally teaches, the affections are known by introspection and it follows that they must be 'clear' or 'attended to'. The denial of the sensational character of tension (attention) leaves us with the problem of the nature of it still upon our hands. The conclusion of the writer—which there is not here time to defend in detail—is that attention is an elemental consciousness co-ordinate in various ways both with pleasantness-unpleasantness (the affections) and with the elemental experience of realness, and thus belonging with these to a larger class of 'attributive elements of consciousness'.[2] This is a doctrine agreeing with Wundt's both in that it admits the unsensational and elemental character of tension (attention) and in that it co-ordinates tension with pleasantness-unpleasantness, but agreeing with the teaching of Wundt's critics in refusing to call tension 'affection' or 'feeling'.

(2). Relaxation, in the second place, probably is merely the absence of strain. Alechsieff himself seems virtually to imply this.[3] So far as relaxation is a positive experience it seems to reduce, as Titchener teaches, to organic sensations.

(3) and (4). The case is different with excitement and quiescence (*Erregung-Beruhigung*). These are complex, not elemental, experiences; and the distinguishing feature of them is neither the organic sensations—though these are present and significant—nor any new kind of feeling, but rather the vivid consciousness of doubtful future or of irrevocable past. This analysis is corroborated by a study of the introspective records

[1] *Op. cit.*, pp. 74, 76, 334.

[2] For further discussion, *cf.* the writer's "An Introduction to Psychology", chapter IX (in the second edition, 1905).

[3] *Cf. op. cit.*, p. 222[1]. Titchener has a similar criticism, p. 145[2].

of those who treat excitement and tranquillity as forms of affection. A striking confirmation of it is found in Royce's discussion of 'quiescence and restlessness': "We tend to regard with restlessness whatever tendency involves our interest in immediately future changes. The emotions of . . . fear, of hope, of suspense are accordingly especially colored by restless feelings. On the other hand, the feelings of quiescence predominate when . . . we regard the past."[1]

The analysis of the Wundtian theory has led, accordingly, to the conclusion that Wundt is unjustified in his teaching of the two new pairs of feelings co-ordinate with each other and with pleasantness-unpleasantness. Only one of the four, namely strain, is either elemental or—in any sense—parallel with pleasantness-unpleasantness. Relaxation, a second of these alleged elements, seems to reduce to bare sensation, where the name does not indicate mere absence of strain. The other two, excitement and quiescence, are, indeed, as the Wundtians insist, unsensational; but the unsensational elements which distinguish them are not affective elements (or feelings), but rather relational elements. A discussion of this third group of conscious elements, and of the theories about them, will form the final section of this paper.

II

The doctrine of elements of consciousness which are neither sensational nor in any sense co-ordinate with the affections or feelings is upheld by psychologists of the most diverse schools. Herbert Spencer was the first to name and to discuss them,[2] but his teaching attracted little notice and thirty years passed before Ebbinghaus rediscovered the *Gestaltqualitäten*,[3] and James wrote of the 'transitive feelings' of 'and', 'but', and 'if'.[4] Today two groups, or schools, and several individuals among Continental psychologists and a considerable number of English-speaking psychologists more or less unequivocally teach the occurrence of elements of consciousness neither sensational nor affective. There is, first, the school of Meinong[5] which discusses relational elements under the names '*fundirte Inhalte*' and '*Gegenstände höherer Ordnung*'.[6] The second of the Con-

[1] "Outlines of Psychology", p. 180[2].
[2] "The Principles of Psychology", first edition (1855), § 81, p. 285.
[3] *Vierteljahrschr. für wissenschaftliche Philos.*, XIV, p. 249, 1890.
[4] "Principles of Psychology", I, p. 247, Note.
[5] A. Meinong: *Zeitschrift*, II, p. 247, 1891; and XXI, pp. 182 ff.; and "Ueber Annahmen", 1902.
[6] A. Höfler ("Psychologie"), and S. Witasek ("Grundlinien der Psychologie", 1907), have incorporated Meinong's doctrine in systematic treatises.

tinental schools is that of Külpe and the students and workers in the Würzburg Institut, Watt,[1] Ach,[2] Messer,[3] Bühler,[4] and others. Individual upholders of the theory are Binet,[5] Stumpf with his doctrine of *Gebilde* and *Verhältnisse*,[6] Cornelius,[7] and, finally, in spite of great divergence in terminology, Münsterberg and Ebbinghaus.[8]

Of writers in English, Stout,[9] R. S. Woodworth,[10] and the writer of this paper[11] have most explicitly taught the occurrence of these elements of consciousness, neither sensational nor affective, which are especially characteristic of what is called thought. Judd, also, describes concept and judgment in terms of relation;[12] and Angell, in spite of his denial of literally imageless thought,[13] seems to indicate by his term 'meaning'[14] a relational experience.[15]

It thus appears that the introspection of a score of psychol-

[1] *Archiv f. die gesammte Psychologie*, IV, 288 ff., 1905.

[2] "Ueber die Willenstätigkeit und das Denken" (based on experiments carried on in Würzburg and in Göttingen), Göttingen, 1905.

[3] *Archiv*, VIII, 1 ff, 1906.

[4] *Archiv*, IX, 297 ff., 1907; XII, 9 ff., 1908.

[5] "L'étude experimentelle de l'intelligence," Paris, 1903.

[6] "Erscheinungen und Psychische Funktionen", Königl. Akad. d. Wissenschaften, Berlin, 1907, pp. 7 ff., 29 ff.

[7] "Psychologie als Erfahrungswissenschaft", pp. 70, 164 *et al.*; *cf.* also *Zeitschrift*, XXII, pp. 101 ff. (1899), where Cornelius develops a teaching of G. E. Müller.

[8] Ebbinghaus ("Grundzüge", I, pp. 410 ff.) recognizes as elements only sensations and affections, while Münsterberg ("Grundzüge", I, pp. 290 ff.) admits sensations only. Yet the first includes under the head of 'general attributes of sensation' and the second groups in the class of value-qualities the identical part-experiences which are here considered as relational elements.

[9] "Analytic Psychology", I, pp. 66; 78-96; II, p. 42.

[10] "Imageless Thought", *Journal of Philos., Psychol. and Scientific Method*, III, pp. 701 ff., 1906.

"The Cause of a Voluntary Movement" in *Studies in Philosophy and Psychology by Students* of *C. E. Garman*, pp. 351 ff.;

"Non-Sensorial Components of Sense-Perception" *Journal of Philosophy*, etc., IV, pp. 164 ff., 1907.

[11] "An Introduction to Psychology", 1901, chapter X (especially in the second edition, 1905); "Der doppelte Standpunkt in der Psychologie, 1905, pp. 25 ff.

[12] "Psychology, General Introduction", 1907, pp. 286 ff.; *cf.* p. 72.

[13] *Philosophical Review*, 1897, pp. 646-657.

[14] "Psychology", 1904, p. 213 *et al.*; *cf.* p, 267[8].

[15] It is to be regretted that enthusiastic upholders of the relational-element doctrine have remained so comparatively oblivious of each other. I find only one writer, later than James, who refers to Spencer's advocacy of the doctrine. The writers of the Meinong school seldom if ever mention any English-speaking upholders of the theory. Dr. Montague alludes, in the James *Festschrift*, to "Professor Woodworth's discovery of the . . . non-sensorial elements of many topics of thought", and Woodworth himself, in the three papers already cited, refers only to Bühler and other writers of the Würzburg school.

ogists, of different periods, prepossessions, and training, speaks unequivocally in favor of the occurrence of elements neither sensational nor affective. It is true that there is no direct physical stimulus of these relational elements and that it is difficult to make out with assurance a complete and definite list of them. Enthusiastic adherents of the doctrine have doubtless alleged as elements what are, after all, complex experiences; but when all has been said, the critics of the doctrine have nothing decisive to urge against the unambiguous introspection of psychologists so divergent in general theory as these already named.

It must be added that this testimony has been fortified, in recent years, by introspection under experimental conditions. One of the latest and most complete of such investigations is made by Bühler whose method—a modification of that of Marbe[1] and Messer—is, in brief, the following. He puts to his subjects, trained introspectors, questions answerable by 'yes' or 'no' which are intended to excite their thought. After a question has been answered the subject at once analyzes the consciousness preceding and leading to his answer. The questions are suited to the interests of the subjects. Illustrations are: "Can you reach Berlin in seven hours"? "Does monism mean the annihilation of personality"? The results of the investigation have been (1) the discovery that in most cases the observers are distinctly conscious of unsensational and non-affective experiences; (2) the apparent occurrence of some cases where no image, verbal nor concrete, can be detected; (3) the confirmation of this introspection by the discovery that a subject often remembers *not* the images, but only the relation—say, of likeness or of opposition—in an earlier experience. Wundt has very sharply criticised the method of these experiments on the ground, mainly, that it involves disturbance of the subject, and that it does not admit of repetition and variation of the experience to be studied.[2] In the opinion of the writer Bühler successfully meets this attack, appealing to the records of his subjects for evidence of their being undisturbed; and holding that repetition and variation are, in fact, obtainable in the essential sense that questions of the same or of regularly varying types may be repeated.[3]

Woodworth's method and results resemble those of the Würzburg school, except that he confines himself to the study of comparison (the discovery of equivalent relation), and that in one group of his experiments he offers concrete material—

[1] "Experimentell-Psychologische Untersuchungen über das Urteil", Leipzig, 1901.

[2] "Ueber Ausfrageexperimente", *Psychologische Studien*, 1907, III, pp. 300-360 (*Cf.* Wundt's rejoinder, *Archiv*, XI, 1908, to Bühler's reply).

[3] *Archiv*, XII, especially pp. 94, 103, 107.

colors and forms—for comparison. Earlier experimenters have found traces of relational experiences in the course of investigations concerned primarily with association. The experiments, for example, by which Professor Gamble and the writer tested Lehmann's assertion that recognition consists in associated images, disclosed a large number of cases in which the consciousness of familiarity, occurring markedly earlier than any associated images, is most readily described as relational experience.[1]

It is highly important to emphasize the fact that this doctrine of a third kind of elemental consciousness is not necessarily synonymous with the hypothesis of imageless thought. The writer of this paper frankly deprecates the tendency of certain psychologists—of Stout, Bühler, Woodworth, for example—to insist that the occurrence of imageless thought has been proved. For it is always possible to question the completeness and the accuracy of the introspect on which this conclusion is based. What is abundantly proved is that along with imagery, and often in the focus of attention, when one compares and reasons and recognizes, are elements neither sensational nor affective. It is unwise and unnecessary to advance a larger claim. Wundt's constructive suggestion that the so-called relational factor in experience analyzes into feeling and attention derives all its cogency, in the opinion of the writer, from the fact, already discussed, that Wundt's feelings include relational factors. In other words, Wundt can afford to deny relational elements because he illicitly and unwittingly holds them concealed within his heterogeneous class of 'feelings'.

From this review of the Wundtian doctrine of the 'feelings' and of the doctrines—diverse in form but alike in essentials—which affirm that there are relational of 'thought'-elements in consciousness it is clear that the domination of sensationalism in psychology has passed. This means the enfranchisement of psychology from the most hampering of the prejudices which have retarded its progress. The *a priori* assumption that all consciousness is completely analyzable into sensational factors has too long interfered with introspective observation. Students of consciousness, successful in finding what they were told to find, have resolved recognition into associated imagery, thought into verbal imagery, and will into antecedent images, with complete disregard of any further outcome of introspection. The downfall of pure sensationalism should be welcomed by psychologists in the interest—not of any other theory—but of free and unprejudiced experimental observation.

[1] "Die reproduzierte Vorstellung beim Wiedererkennen", *Zeitschrift*, 32, pp. 177 ff., especially p. 192. The study of Watt, already cited, is primarily an investigation of association.

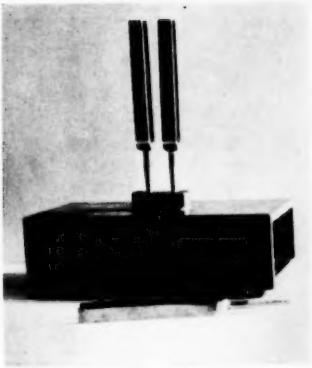
SOME NEW APPARATUS

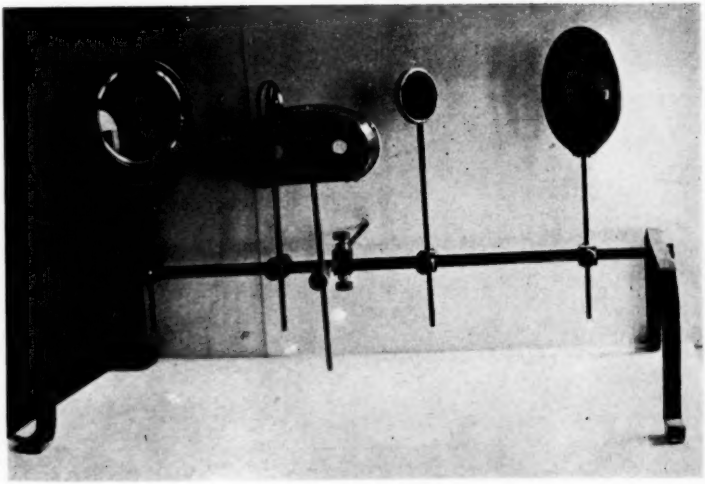
I. An Observation Table

By Madison Bentley

The table is designed for the experimental observation of protozoa and other small animal forms, *e. g.*, the smaller insects, crustaceans and worms. The top of the table is made of ⅜ in. sheet brass, 15 x 20 cm. The legs are ½ in. brass posts, furnished at the bottom with levelling screws. An opening in the top receives an ordinary microscopic slide which lies flush with the surface. The slide is illuminated from below by means of a mirror, 5 x 10 cm., supported upon a horizontal axis which pierces the posterior legs. The table is placed with its back toward a window or near an electric lamp, and the mirror is rotated by a milled head at the right until the observation-slide falls within the path of the reflected rays. The opening below the slide is beveled toward the mirror to avoid a shadow. The whole of the upper surface of the slide, then, save a supporting strip upon three sides, is illuminated by strong transmitted light. A magnifying glass, 4 x 9 cm., swings in from the left when the slide is in place. The magnifying glass is focused by means of an adjustable collar rotating upon the table, and is fixed in position by two set-screws, the one at the left end of the table and the other in the horizontal support of the glass. The slide and the observer's eyes are protected from the direct rays of light by a thin sheet-brass screen, which rises 20 cm. from the convex posterior edge of the table-top and is continued half way across the ends. The observer looks through the enlarging lens straight down upon the slide, thus avoiding the direct rays of the mirror. A black background to the field of observation is secured by a thin shield which swings eccentrically between the anterior legs of the table, just clearing the mirror. When the shield is raised at the rear, its upper surface lies in shadow, and against this shaded surface the objects under examination stand out in relief. The entire apparatus is finished in dull black.

The writer has made use of Professor Jennings' slide-cell (cover-glass or second slide supported upon capillary tubing or glass strips) for protozoan responses to chemicals, carbon dioxide, temperature, etc. He has also used a slide tank (strips of glass cemented around the edge of the slide), wax-





pits (moulded upon the slide and connected subterraneously by capillary tubing), the capillary-tank (designed for the prolonged observation of a single individual), and various simple forms of the maze or labyrinth which are fashioned out of hot capillary tubes and secured to the slide by means of glass cement. The removal of a second section of the table-top permits the insertion of a square glass floor of ampler dimensions than the standard slide affords, for the intimate study of forms of considerable size.

In the construction of the Observation Table, the writer has had in mind the needs of junior students who lack the resources and the technique of the investigator; more specifically he has tried to bring within the limits of a training course, for the study of the simpler and lower forms, experimental conditions that are already realized in the current psychology of the higher animals.

II. A Demonstrational Stereoscope

By E. B. Titchener

The instrument shown at the bottom of the accompanying Plate is a combination of Wheatstone stereoscope, Helmholtz telestereoscope, and Mach pseudoscope. Its only novel feature is its extreme simplicity.

The materials, besides rods and clamps, are two hand-mirrors, two pocket-mirrors, and an ordinary stereoscope-hood from which the lenticular prisms have been removed. If we use the faces of all four mirrors, we have a telestereoscope. If we use the faces of the smaller mirrors, and affix stereoscope diagrams to the backs of the larger mirrors, we have the Wheatstone stereoscope. Finally, if the one eye is allowed to look directly at an object, while the other eye views the same object twice reflected (one large and one small mirror), we have the mirror pseudoscope. The arrangement of parts will be readily understood from the figure.

III. Tuning-Forks for Tests of Pitch-Discrimination

By E. B. Titchener and G. M. Whipple

The arrangement of tuning-forks figured in the upper part of the accompanying Plate shows our solution of a troublesome little problem. We wished to devise a means of testing the discrimination of pitch, with especial reference to the experimental study of school-children; and the requirements were that the apparatus should be inexpensive, as compact and

portable as possible, reasonably accurate and reliable, and so designed as to demand relatively little technical skill on the part of the experimenter.

Experience led us to discard at the outset strings, reeds, bottles and other wind-instruments, and to turn to tuning-forks. For discrimination work with forks, the experimenter must be able to produce readily and accurately a constant stimulus, and any one of a series of 8 to 10 variable stimuli. Such a series may be obtained from a pair of forks, the one of which carries sliding weights, etc., or from a number of forks, each one of which gives a single tone of constant pitch.

Adjustable riders of the sort used by Luft were unsuited to our purpose. They are difficult of manipulation by the inexperienced experimenter; the vibration difference must, after every determination of the difference limen, be computed anew by the laborious (and often difficult and inaccurate) method of counting beats; and the timbre of the two forks is often so different as to afford a secondary criterion of judgment. Screw-tipped forks, of the type suggested by Meyer, present similar disadvantages and are, furthermore, too limited in their range of adjustment to be available for tests of discrimination with unpractised or unmusical observers.

The problem is therefore narrowed down to that of finding an inexpensive and reasonably accurate set of forks, and of devising simple means of manipulation.

Seashore advises the employment of a single standard and a set of 10 variable forks, yielding stimulus differences of 0.5, 1, 2, 3, 5, 8, 12, 17, 23 and 30 vs. respectively[1]. Eleven forks of the standard laboratory type, mounted on resonance boxes, would be too expensive and too bulky to meet our requirements. The forks might be left unmounted, and be held after striking upon a single resonance box; but this method fails to guarantee even an approximate constancy of intensity. We have therefore made up a single resonator, upon which any pair of forks may be mounted together, and we have selected for the forks themselves the *a*-forks of 435 vs. sold by music houses at 50 cents apiece as 'extra heavy' forks for piano-tuners. The tines measure about 4.5 by 10 mm. in cross section and are about 95 mm. in length.

The ten variable forks are flatted as required by filing at the base of the U. The ball-tip with which they are supplied is filed away, and the stem is brought in the lathe to a tapered tip. The upper surface of the resonance box carries, as fork pedestal, an oval block of oak 45 mm. long, 20 mm. wide and 12 mm. thick, into which are sunk two conical holes, 20 mm.

[1]For most test work, the 0.5 stimulus-difference may be omitted.

apart and 10 mm. deep, for the reception of the stems of the two forks. The block is separated from the box by a single layer of chamois skin, and is secured to it by two light brass screws.[1]

The method of use is evident from these details of construction. The standard fork is set in the one hole, the variable in the other, with the axes of both crosswise to the box. The silent fork is damped by the finger while its mate is sounding, the finger is then transferred to the sounding fork, and the other is struck. Other variable forks are inserted as required. It is plain that any form of method may be employed. The tones themselves are rather surprisingly full and clear.

For transportation, the forks are wrapped in chamois skin and slipped into the resonance box.

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[1]The purpose of the chamois-skin layer is to eliminate the high partials which otherwise obscure the fundamental of a light fork when it is first struck. The screws are necessary, since, if glue is employed, the leather loses its elasticity. The dimensions of the block are reduced to a minimum in order to avoid overloading the box. The holes are made as shallow as is compatible with a firm support of the forks, since a deeply drilled hole in a tall pedestal seriously impairs the tone of these forks.

MINOR STUDIES FROM THE PSYCHOLOGICAL LABORATORY OF VASSAR COLLEGE

XI. The Effect of Mental Type on the Interference of Motor Habits

By M. McMein and M. F. Washburn

The original purpose of this study was to investigate the influence on the amount of interference exerted by one habit on another, of the simplicity or complexity of the habits concerned. In other words, we wished to find whether two relatively complex habits interfered with each other in a less or a greater degree than two relatively simple habits. For this purpose we made use of the card-sorting habits first investigated by Bergström (this *Journal*, vol. 5, pp. 356 ff.). In the first part of each experiment a pack of cards was used, containing ten cards bearing each of four different nonsense syllables of three letters, thus forty cards in all. Upon a large sheet of paper a square was drawn containing four compartments of about 20 cm. a side, and each of these compartments was marked in large letters with one of the nonsense syllables. The pack of cards was thoroughly shuffled, and the observer was directed to sort the cards on the diagram as rapidly as possible, the time required to complete the sorting being taken with a stop-watch. After an interval of one minute, during which the experimenter shuffled the cards, a second diagram was supplied on which the syllables were differently placed, and the observer was required to sort the cards as fast as possible in this new arrangement. If the time of the second sorting was longer than that of the first, the delay was supposed to be in part at least due to the interference of the earlier acquired habit with the acquisition of the later one, in accordance with Bergström's view. The second part of each experiment consisted in repeating this procedure with a pack containing ten cards carrying each of six different syllables, sixty cards in all. In the third part, a pack with eight different syllables, ten cards for each, eighty cards in all, was used, and in the fourth part a pack with twelve different syllables, a hundred and twenty cards in all. Thus in the four parts of the experiment habits of four different degrees of complexity were involved. As the time of sorting the larger packs was of course longer than that required to sort the smaller ones, the amount of interference was stated in terms of the ratio to the time of the first sorting, of the amount of delay in the second sorting. Thus, if t represents the time of the first sorting, and t′ that of the second sorting, t′-t = the delay in the second sorting, presumably due to interference, and $\frac{t'-t}{t}$ represents the ratio of the amount of interference to the time required by the first sorting. It was this ratio that we recorded. We wished to find whether this value would increase, diminish, or remain unaffected when the complexity of the habits was increased. Three observers took part in the work, M and W, the writers, and H, a woman student in her second semester of laboratory work. Ten complete experiments of four parts each (eight sortings in an experiment) were made and averaged for each observer. The results were as follows:

Observer	Average values of $\frac{t'-t}{t}$			
	Four pack	Six pack	Eight pack	Twelve pack
M	.20	.29	.24	.17
W	.23	.16	.15	.14
H	.18	.21	.23	.13

It will be seen that the only point in which the three observers agree is that they all show the least amount of interference in the case of the most complex habit. Although in the case of all four grades of complexity, the habits were allowed an equal chance to be learned, since a given card was always placed in a given position ten times during the sorting; although each movement in each set of sorting movements was thus performed exactly the same number of times, and had the same chance to impress itself on the nervous system, the most complex habit was not so well learned as the simpler ones, indicating that the difficulty of acquiring a habit increases not in direct proportion to its complexity, but more rapidly. It is further evident that observers M and H found the simplest habits interfering less with each other than those of moderate complexity. This, it was gathered from their introspections, was due to the fact that in the very simple four-position sorting, the second diagram was learned on its own account so quickly that the disturbing effect of the first diagram wore off after a few seconds. These same introspections revealed an important cause for the individual differences in our results. M is of a decidedly visual type of mind. In sorting the cards, she rapidly formed a visual image of the diagram and guided herself almost entirely by this. She did not need, after the first seconds of a sorting process, actually to look at the marks on the compartments, because she had a picture of the whole chart in her mind. W, on the other hand, is decidedly below the average in visualizing power. She learned the diagrams almost wholly in motor terms, and at the end of a sorting was quite unable to recall the position of more than two or three syllables on the more complex diagrams, having scarcely any visual image of the diagram. M, on the contrary, could reproduce all the diagrams perfectly from her mental pictures of them. H seemed to occupy a middle position as to type; her visual images were not so marked as M's, nor by any means so defective as W's. It will be seen from the results that the degree of interference in W's case diminished steadily as the complexity of the habits increased. W did not find that the simplest diagram was less favorable to interference than those of moderate complexity. While for M and H, learning the diagrams by a visual method, the second diagram in the four-position sorting was learned so quickly that it soon effaced the visual memory of the first diagram, for W, in whose case the memory of the first position diagram was almost wholly motor, this memory persisted much longer and seriously interfered with the formation of the new habit. We have here a suggestion of the fact that visual images are acquired and effaced more rapidly than motor habits. While M and H both used visual images in their learning, these images were naturally more effective in the case of the simplest chart, where they were formed almost at the outset of the sorting. Hence the images functioned to reduce the interference effect in the case of this diagram by facilitating the learning of the new position; while in the case of W we have the law that simpler habits are acquired better than complexer ones even where each movement in all the habits is repeated an equal number of times, holding without exception.

This difference of mental type in our three observers suggested two supplementary sets of experiments. It occurred to us, first, that an observer whose card-sorting was guided by a mental picture of the

diagram would be much less disturbed when the diagram was turned about through an angle of ninety degrees than would an observer whose learning was done largely in motor terms, for the former could without much difficulty turn her mental picture of the chart about to correspond with its new position, while the latter would be bewildered by the fact that all the movements involved in sorting would be entirely changed by the rotation. Accordingly this point was investigated in the following way. The four-syllable pack was first sorted on one of the diagrams used in the preceding tests, and then after the usual one-minute interval the diagram was turned through ninety degrees and the observer was required to repeat the sorting process. Five such experiments were made by each of the two observers M and W. The average delay involved in making the second sorting, in the rotated position, with observer M was —2.6 seconds; that is, M made the second sorting more rapidly than the first. She was little, if at all, disturbed by the rotation, and reported that she visualized *herself* as having moved around in front of the diagram in its new position, and guided herself by her memory picture of the chart. When a similar test was made with the six-syllable pack on observer M, she showed an average delay of one second in the rotated position, thus suggesting that the visual image was actually less effective for this more complex diagram. When observer W, on the other hand, was put through this test, the average delay in sorting the cards on the rotated diagram was, for the four-syllable pack, 6.9 seconds, and for the six-syllable pack, 11 seconds. This observer had great difficulty in sorting the cards on the rotated diagram, and constantly made false movements in accordance with the habit for the original position of the chart, while M made few or no such movements. The results were thus in accordance with what we should expect from the mental type of the observers.

In the second place, it seemed possible that a person who used much visual imagery in the card sorting would be more affected by distractions tending to suggest visual images, or indeed any mental images of whatever sense department, than one whose sorting was almost purely motor. Accordingly, four tests were made with each of the three observers, M, H, and W, in each of which the four-syllable pack was first sorted without distraction, and then, after a one-minute interval, sorted again on the same diagram while the experimenter read aloud. The observer was required to give from memory at the close of the experiment the substance of the passage read. Since the sorting under distraction was done on the same diagram as that without distraction, practice should have shortened the time occupied by it, and any lengthening would be in spite of practice. Observer W was not at all delayed by the reading aloud. The time of the sorting under distraction was on the average 2.2 seconds less than that of the sorting without distraction, and W's recollection of the substance of the reading was as good as that displayed by either of the other observers. Observer M, the most 'visual' of the trio, was delayed by the reading, on the average, 11.5 seconds, and observer H was delayed 10.5 seconds. As M sorted the cards in general more rapidly than the other two observers, her delay under distraction was, in proportion, much greater than that of H or W. The ratios of the average amount of delay under distraction to the average time of an undistracted sorting were as follows: for W, —.4; for H, .15; for M, 2.2. It will thus be seen that the most visual observer suffered most, and the most motor observer least, under distraction.

The first mentioned of these two special tests of the influence of mental type on card-sorting, that where the diagram is rotated ninety degrees, has been made use of to some extent in our laboratory as a method for determining type, and seems to promise well.

PSYCHOLOGICAL LITERATURE

An Introduction to Social Psychology, by WILLIAM MCDOUGALL. Methuen & Co., London, 1908. pp. 351.

This book is one more token of the increasing leaning of psychologists to pass from the study of the individual to that of society. It is an inclination which the sociologist especially should encourage, for he needs the services of his brother scientist in order to lay bare "the springs of human action, the impulses and motives that sustain bodily and mental activity and regulate conduct." How much Ethics, Political Economy, the Philosophy of History, and Jurisprudence have suffered from an insufficient understanding of their psychological foundation, is indicated in the introduction.

The indispensable preliminary of all social psychology is, we are told, the study of the springs of human action, for "social psychology has to show how, given the native propensities and capacities of the individual human mind, all the complex mental life of societies is shaped by them and in turn reacts upon the course of their development and operation in the individual." (p. 18.)

The first section (pp. 19-264) is offered as a propædeutic of Social Science. In the second section (pp. 265-351) are "indicated some of the ways in which the principal instincts and primary tendencies of the human mind play their parts in the lives of human societies." I shall devote the space at my disposal entirely to the first section, for it not only makes up three-quarters of the volume, but it contains also most of what there is in it of originality and importance.

The author's starting point is the proposition that human nature has everywhere and at all times certain inherited tendencies which are the essential motive powers of all thought and action. These innate tendencies are either specific or general. The first are the instincts. His definition of instincts is noteworthy for the rôle ascribed in them to consciousness. They are not compound reflex actions for "every instance of instinctive behavior involves a knowing of some thing or object, a feeling in regard to it, and a striving towards or away from that object." (p. 26.) He insists upon the psychical aspect of instinct because in its absence it would be "impossible to understand the part played by instincts in the development of the human mind." (p. 30.) Of the three parts — afferent, central, efferent — of the innate disposition, the first and the third are widely modifiable, while the central part persists throughout the life history of the individual as the essential unchanging nucleus of the instinctive disposition. As the central part determines the impulse to action and the visceral changes, its constancy means the constancy of the affective aspect of the instinct (p. 42).

In the third chapter is presented a view of the relation of emotion to instinct which the author is, it seems to me, warranted in regarding as embodying an advance in the understanding of this difficult problem. McDougall regards each one of the primary emotions as the affective aspect of one of the principal instincts and the derived emotions as the outcome of the interaction of several instinctive dispositions. According to this definite relation, the emotions have no independent existence; they come and go with instincts or other in-

nate motor tendencies. Those familiar with the theory of emotion set forth by Dewey and Paulhan will regret that McDougall has not made use of it. For it seems that a completely satisfactory view of emotion must take into account the rôle played in its production by antagonistic motor tendencies. The rest of the chapter is given up to a study of the principal instincts of man and, first, to the more definite ones. Each instinct is taken up together with its affective aspect. The principal instincts and the primary emotions are:

1. The Instinct of flight and the emotion of fear, an instinct with a double tendency in most animals, one of flight and one of concealment.
2. The Instinct of repulsion and the emotion of disgust.
3. The Instinct of curiosity and the emotion of wonder.
4. The Instinct of pugnacity and the emotion of anger.
5. The Instinct of self-abasement (or subjection) and the emotion of subjection.
6. The Instinct of self-assertion (or self-display) and the emotion of elation.
7. The parental instinct and the tender emotion.

Some have refused to place this last emotion among the primary. McDougall holds that "the most powerful of the instincts" is accompanied by a strong and definite emotion, namely the tender emotion. There is a touch of scorn in the tone with which he rejects the doctrine which would make the tender feelings as purely self-seeking as any other pleasure. He finds in this instinct-emotion the root of disinterested indignation, itself the ultimate root of justice and of public law. If we hold with Bain to hedonic calculation, instead of to instinct-emotion, "disinterested beneficence and moral indignation . . . remain a paradox and a miracle." (p. 79.)

The rôle of pleasure and pain in conduct is discussed in several places (pp. 8-10, 43, 154 ff, 190, 237, 256). Everywhere he opposes the instinctive impulse to the guidance of pleasure and pain. Yet he does not commit the mistake of denying these processes all influence on action, "they serve . . . . to modify instinctive processes, pleasure tending to sustain and prolong any mode of action, pain to cut it short; under their prompting and guidance are affected those modifications and adaptations of the instinctive bodily movements." . . . (p. 43.)

Among the less well-defined emotional tendencies he considers, are the instinct of reproduction, sexual jealousy, female coyness, gregariousness, acquisition and construction.

Sympathy, suggestion and imitation are brought together in an instructive way in Chapter IV, for these three "general or non-specific innate tendencies" are as many forms of mental interaction. Sympathy involves chiefly the affective; suggestion, the cognitive; imitation the conative aspect of mental life. We speak, for instance, of imitation when the prominent result of the interaction is the reproduction of the bodily movements of one person by another. These three innate tendencies are not to be called instincts for they do not conform to the three tests of a true instinct: there is, in imitation, for instance, nothing specific in the nature of the sense-impressions by which the movements are excited or guided, no common affective state and no common impulse seeking satisfaction in some particular change of state (p. 103). The expression "instinct of imitation" has been used so loosely of late that one is grateful for this analysis and classification.

The observation that animals in their fighting plays do not hurt each other suggests to our author a modification of the theory of Prof.

Groos. Fighting plays are not the manifestation of the fighting-instinct restrained by a strong volitional control; they are the expression of a particular modified form of the combative instinct, an instinct differentiated from and having an independent existence alongside the original instinct (pp. 110-112). I cannot persuade myself that individual adaptation of the fighting instinct does not account satisfactorily for the play. Animals learn surprisingly fast how to adapt the intensity of their efforts to particular circumstances. If, however, McDougall's opinion should be accepted, would it not have to be extended so as to include practically all plays, for every one of them is the expression of an instinct definitely modified?

In Chapter V is discussed the nature of the sentiments and the constitution of some of the complex emotions. His attempt to exhibit admiration, awe, gratitude, scorn, envy, reproach, jealousy, resentment, shame, etc., as fusions of the primary emotions considered in an earlier chapter, is illuminating and displays, in many places, an admirable penetration. McDougall accepts as valid and of great value Shaud's doctrine of sentiment. On several points, however, he separates himself from Shaud, whose views, unfortunately for the psychologist, have not yet been fully published. One such point is the nature of sorrow and of joy (pp. 80, 149 ff). They are regarded by many as primary emotions; our author looks upon them as "pleasure-pain qualifications of emotional states rather than emotions capable of standing alone." Joy is more than pleasure, "it is a complex emotional state in which one or more of the primary emotions, developed within the system of a strong sentiment, plays an essential part. We ought, then, properly to speak not of joy, but of joyous emotion."

If our emotions and our impulses were not organized, our social relations and conduct would be chaotic and unpredictable. An organized system of emotional dispositions centred about some object is what Shaud calls a sentiment. The remaining four chapters of the first section are given up to the development of the sentiments and chiefly to that of the self-regarding sentiment which is, together with the sentiment for self-control, the master sentiment of a fully developed person. Love, hate and respect form the three main classes of sentiments.

Four levels of conduct are distinguished: "(1) the stage of instinctive behavior modified only by the influence of the pains and pleasures that are incidentally experienced in the course of instinctive activities; (2) the stage in which the operation of the instinctive impulses is modified by the influence of rewards and punishments administered more or less systematically by the social environment; (3) the stage in which conduct is controlled in the main by the anticipation of social praise and blame; (4) the highest stage, in which conduct is regulated by an ideal of conduct that enables a man to act in the way that seems to him right regardless of the praise or blame of his immediate social environment," (p. 181.) The first and second levels do not involve more than the promptings of instinct; the two others are made possible by the appearance of the idea of the self. The development of the idea of the self is, of course, closely bound up with that of the self-regarding sentiment.

The influence of praise and blame on men's conduct passes all rational grounds. Whence this profound influence? The conclusion reached is that it is the outcome of "the influence of authority or power, primarily exercised in bringing rewards and punishments .... and [of] the impulse of active sympathy towards harmony of feeling and emotion with our fellows." (p. 201.)

There remains to be shown how from the merely egoistic levels man rises to the fourth and highest. Attention is first drawn to a connecting link. Men may be moved not so much by the approval or disapproval of some one, as by the fact that this approval or disapproval is pleasant to the one who expresses it. This motive "constitutes . . . . a very effective supplement to the egoistic motives." (p. 203). But it is through original moral judgments of approval and disapproval, and not through unquestioned subserviency to praise and blame, that a man rises to the higher plane of conduct. In those primitive societies in which rigid rules govern every detail of life, original moral judgments are hardly possible, whereas the diversities of the moral codes of the various circles among which the civilized man moves stimulates reflection and leads to original moral judgments. Thus are formed an ideal of conduct and "a sentiment for a perfected or completely moral life" without which no man will be able to reach the highest plane of conduct.

A final point remains to be elucidated. How comes it that in some men—those regarded as the best—the presence of an ideal and of a sentiment for the ideal become the dominant motives of conduct. The elucidation of this dynamic problem leads to a valuable discussion of the nature of volition. McDougall agrees with James that "the essential achievement of the will is to attend to a difficult object and hold it fast before the mind;" and he maintains further that this achievement is due to an addition to the energy with which the idea of the desired end maintains itself in consciousness. But he is a determinist; for him the chief source of this addition is in conations, desires and aversions arising within the self-regarding sentiment (p. 248), and so he defines volition "the supporting or re-enforcing of a desire or conation by the co-operation of an impulse excited within the system of the self-regarding sentiment." (p. 249.) "The essential mark of volition [when separated from the other varieties of conation] is that the personality as a whole, or the central feature or nucleus of the personality, the man himself, ... is thrown upon the side of the weaker motive. . . ." (p. 240.)

The operation of the self-regarding sentiment in him who has conceived the ideal of the perfectly moral life, gives the appearance of independence of the appeal of society, "it enables him to substitute himself, as it were, for his social environment." (p. 254.) "Moral advance and the development of volition consist, then, not in the coming into play of factors of a new order . . . . but in the development of the self-regarding sentiment and in the improvement or refinement of the 'gallery' before which we display ourselves . . . and this refinement may continue until the 'gallery' becomes an ideal spectator or group of spectators, or, in the last resort, one's own critical self, standing as the representative of such spectators." (p. 257.) This ultimate reference, in the highest type of conduct, to self-respect will give most readers a shock of surprise. One was not prepared for this apotheosis of self-esteem. The author does not, however, if I understand him right, set up the maintenance of one's self-respect as the highest aim of conduct. His view is rather that the ideal of conduct, the aim which the good man endeavors to realize, is thoroughly altruistic, namely the highest good of the greatest number, but that ideal to have power must be backed by some of the strong innate dispositions, otherwise it would remain a relatively impotent item of knowledge. The self-regarding sentiment it is which supplies the energy necessary for the realization of the altruistic ideal. But even when thus understood, his analyses of instances of self-sacrifice (p. 252) represent, in my opinion, what actually takes place in the mind

of the majority of noble men but is not true of those generally regarded as the finest fruit of social development. These rare people, I will venture to say, act as they do in great moral crises without reference to the effect of their conduct on their self-esteem. Or, rather, one had better say that in them the consciousness of self has lost its original narrow individualistic meaning and has taken on a social significance. McDougall's history of the development of self-consciousness appears to me defective in that he does not recognize that the completed moralizing process involves the existence of a form of social consciousness which includes the idea of the self. This seems to me the most serious criticism one can make of a book, which because of considerable originality and definiteness of presentation, cannot fail to stir up much discussion. Considered as a whole, its most striking characteristic is the masterly firmness and thoroughness with which it traces the development of man up to his complete socialization on the basis of fundamental innate dispositions and social interaction.

Bryn Mawr College JAMES H. LEUBA.

The Psychology of Skill, with Special Reference to its Acquisition in Typewriting, by W. F. BOOK. University of Montana Publications, Bulletin No. 53. Psychological Series, No. 1, pp. 188.

The object of this study, the work of which was done in major part at Clark University, was two-fold. (1) To determine accurately the course of the practice curve for a number of individuals. (2) To analyze consciousness for the different practice stages shown by the individual curves.

Recording apparatus was attached to an Underwood typewriter and gave records on a smoked drum of the following items: (1) Stroke for each letter; (2) strokes on the word spacer; (3) movement of the carriage for a new line. Simultaneously with these, records were made on the drum of (4) the time spent by the writer (in the visual method of writing) in looking at the copy, the experimenter recording this by means of a separate key; (5) time marker beating seconds; (6) pulse rate of the writer while writing. The normal pulse rate was taken in another manner each time before beginning. Detailed introspective observation was required of the writers at all times. Eleven observers participated, including beginners who continued practice until a semi-expert stage had been reached, and professional and expert writers. Both the touch and the visual methods of writing were employed. In addition, three of the observers wrote practice sentences until an expert speed was obtained in these sentences.

The presentation of the results falls, roughly, into two parts. (1) Analysis of the learning consciousness. (2) Explanation of the characteristics of the practice curves. For both the visual and the touch methods of writing four stages of practice are made out. For the touch method they are the following: (a) The beginning stage, when the whole writing process involves a number of definite conscious steps. (b) The letter association stage, which is reached when the "sight of the letter in the copy or the first pronunciation of it calls up at once the direct movement for striking the proper key." (c) Syllable and word association stage. This is reached when incipient pronunciation of the word calls forth at once the group of movements, when the motor-tactual image for the group of strokes (general 'feel' for the group) as a means of writing is being eliminated. (d) Expert stage, writing by phrases and sentences. This is reached when the writing becomes continuous, the strokes following the incipient pronunciation of the words without breaks or further conscious processes. In learning by the visual method these several practice stages are represented by different conscious factors, but in the expert stage the

visual approaches the touch method as regards the conscious factors that are involved. The details of the analysis for both methods are concerned with the way in which these different practice stages are developed, by 'short-circuiting' and elimination of conscious processes present at first, by changes in the direction and distribution of the attention, by the development of new ways of getting the copy, by the appearance, development and final disappearance of motor-tactual imagery for the individual stroke, for the small group of strokes, for syllables and words, and for larger groups.

The explanation of the characteristics of the practice curves brings into consideration a complex relationship of factors. The initial rapid rise in all curves is due to the fact that several lower order habits (ways of writing in the letter and the syllable and word association stages) are then developing together, and each more rapidly than later. Higher order habits (those involved in phrase and sentence writing) do not begin fully until the lower are fairly well developed. But the Bryan and Harter interpretation of plateaus is wrong in so far as it attributes them to a necessary and slow perfecting of the lower order habits before the higher can begin at all. These long plateaus occur towards the close of the syllable and word association stage, which may therefore be called a 'critical stage.' At this point the learner is very prone to do one of two things. Either he will (1) relax his effort and fall back to lower order habits of writing instead of pushing ahead; *i. e.*, he is 'caught' in the more or less fixed habits of this stage. Or, (2) he will assume a freedom and skill that he does not yet possess, will direct his effort to speed alone and take it from those processes that still require some conscious direction. In this lies the explanation of the long plateaus. The objective records and the pulse rate reinforce this explanation from the direct observations. High pulse rate always goes with great effort, but the effort may be wrongly directed (to speed alone), and result in a slow rate of writing. The latter was the case for the practice sentences and their plateaus at this stage of practice. For the regular writing from copy a constant high pulse rate is correlated with periods of several days or more of rapid rise in the curve, and a constant low pulse rate is correlated with the plateaus. The explanation for the smaller irregularities in the daily practice curves is more complex. In all cases, taking the attention entirely from processes that still need some conscious direction, or directing the effort to speed alone, results in many mistakes in writing and in 'education in error', which has to be unlearned again before further progress can be made. The effort is apt to be wrongly and inefficiently directed in this way on 'bad' days, at the beginning of each daily period of writing, and at other times when the learner becomes conscious that his rate of writing is low. Maximum effort counts only when the conditions, objective and subjective, for fast and correct writing are favorable. On the other hand, it is maximum effort alone under these favorable conditions that makes for progress in learning, establishes new 'short-circuits' and higher habits of writing.

The monograph is abundantly illustrated by quotations from the direct observations of the learners, by tables, curves and specimen drum records.

F. KUHLMANN.

Nervous and Mental Diseases, by A. CHURCH and F. PETERSON. With 341 illustrations. Sixth edition, thoroughly revised. Philadelphia and London, W. B. Saunders Co., 1908. pp. 945. Price, $5.00 net.

The fourth edition of this admirable text-book (1903) was noticed in Vol XV, p. 452, of the *Journal*. The fact that the work has passed

through six editions since its publication in 1899 is sufficient evidence that it is appreciated by the medical students and general practitioners for whom it is primarily intended.

As was pointed out in the notice of the earlier edition, a section of special interest to psychologists is the Review of Recent Problems in Psychiatry by Professor Adolf Meyer (pp. 662-700), which deals particularly with the work of Kraeplin, Ziehen and Wernicke. But apart from this, the book is a valuable addition to the working library of the psychologist.

The two sections have been written independently: that on Nervous Diseases (pp. 17-652) by Dr. Church, and that on Mental Diseases (pp. 653-916) by Dr. Peterson. "Each author has contributed to a single volume what might have been made a separate monograph." While this arrangement has its conveniences, the resulting volume is so heavy and unwieldly that it might, perhaps, be well to consider the publication of the seventh edition in two parts.

Mind and its Disorders, by W. H. B. STODDART. P. Blakiston's Son & Co., Philadelphia, 1909. 488 p.

This work seeks to give both student and practitioner a succinct account of our existing knowledge of mental diseases. The author would induce the reader to think untheoretically of mental processes, normal and morbid, his own work for twelve years being chiefly clinical research into the nature of nervous phenomena associated with mental disorders. In its first section, which deals with normal psychology, he seeks to correlate mental processes with their physical substrate in the nervous system, "the transcendental psychology of the modern school men being ignored as useless to the practical physician of today." In the second section, the psychology of the insane is treated in a similar manner. The classifications largely coincide with those of Kraepelin, although some of his nomenclature has been changed. The author has made free use of standard psychologies, and perhaps the chief feature of the book is precisely that of which the author himself evidently is most conscious, namely, the account of normal processes of sensations, perception, ideation, sleep, fatigue, sentiments, language, the ego, etc. In treating the psychology of the insane, he also follows a similar order, treating in sequence disturbances of sensation, perception, association, emotion, abnormalities of action and of judgment, or delusions. In the third part, on mental diseases, the chapters treat causation, physical stigmata, degeneration, intermittent and periodic insanities, the insistent psychoses, alcoholism, paranoia, psychæsthenia, neurasthenia, hysteria, troubles due to organic diseases, idiocy, visceral disease, combined psychosis, diseases to which the insane are peculiarly liable, case taking, feigned insanity, the relations of the insane to law, methods of studying the nervous system and cytological examinations of the cerebro-spinal fluid, etc. The author has nearly one hundred cuts, and perhaps this book might be called the most compendious and concentrated textbook now available. Personally we regret that the author does not deal more fully with the newer methods represented by Janet and Freud, Kraepelin from our point of view being intermediate between the old views and these, which seem to be the psychiatry of the future.

Les Névroses, by PIERRE JANET. Ernest Flammarion, Paris, 1909. 394 p. (Bibliothèque de Philosophie scientifique.)

This work gives us a rapid *résumé* of the author's many studies during the last twenty years. As to each function, he describes and compares two groups of symptoms — hysterical and psychæsthenic. Thus among mental disorders we find fixed ideas of somnambulists

and the obsessions of the over-scrupulous; while in the disturbances of movements, there are hysterical paralyses which seem closely related to the phobias of action. In perceptive troubles, we have hysterical anæsthesias, despite the algies of psychæsthenic dysgnosias. These comparisons present the psychological differences which exist between the various neuropathic disturbances appearing on the neurotic bases. Everywhere functions are more or less intact in their essential and older parts, but they are decapitated by the reduction or suppression of the more recent and more perfected ones. Thus neuroses present more diverse forms of regression and involution caused by various depressive influences. Under Part I, neuropathic symptoms, the writer treats fixed ideas and obsessions. Then follow in order chapters on amnesias and doubts, disturbances of speech, chorea and tics, paralyses and phobias, perceptive troubles, instinctive and visceral disorders. The second part, which treats of neuropathic states, contains five chapters, as follows: on nervous crises, neuropathic stigmata, the mental state of hysteria, the psychæsthenic state, what are neuroses? The answer to the last question may be roughly indicated by the phrase that they are diseases of functional evolution.

Psychology, Normal and Abnormal, by WARREN E. LLOYD, and ANNIE ELIZABETH CHENEY. Baumgardt Pub. Co., Los Angeles, Cal. pp. 127.

As the authors have themselves written a critique of this book, which appears just before the table of contents, we will allow them to speak for themselves. "Now whatever the learned may say hereafter (and the learned will most surely investigate this book), they cannot undermine its foundation or destroy its structure." "No flaw can be found in the logic from start to finish." "It throws no sop to the Cerberus of superstition, it pampers no morbid dabbler in so-called 'new thought', it tickles no nerve of religious fanaticism; but straightforwardly relies upon principle, logic and facts, daringly throwing down the gauntlet to antiquated psychology, and through its up-to-dateness in all directions defies bigotry and challenges criticism." "It is a text-book for students in colleges and a volume for their professors also." "It is safe to say that a profound study of this work will have a practical outcome, and we dare to assert that he who delves into it deeply enough will find a key to the problem of life itself. *Little attempt has been made in this text-book to deal with data newly discovered, or facts gained by specialists along any of the lines of modern research that might bear on the question*, for, once having started in the trails of these sleuths of modern sciences, there would be no end to the fruit gleaned, and no possible way in the limited space of a compact work of this kind of dealing with it satisfactorily. *So the effort rests contentedly on its principle alone.*"

The value of the book to the student of modern psychology is indicated by the italics, which are my own. AMY E. TANNER.

Psychological and Medical Observations among the Indians of southwestern United States and northern Mexico, by ALES HRDLICKA. Government Printing Office, Washington, D. C., 1908. 460 p.

This indefatigable observer here gives us a wealth of interesting observations on subdivisions of the tribe, personal environment, food, drink, habits of life, character, social conditions, marriage, children, on whom he makes very many interesting observations—growth, height, puberty, dentition, etc.—and then passes to the adults, having studied stature, muscle, force, the skin and its appendages, special senses, sleep and dreams, mental and nervous power, digestion,

obesity, grayness, loss of hair, sterility, etc. He then takes up social abnormalities, like artificial operations, infanticide, crime, suicide, etc. Under medical observations, he treats of pathology in general, and then the special diseases—goitre, insanity, epilepsy, idiocy, spinal curvature, tuberculosis, etc. Very interesting is his chapter on Indians' notions of disease, and the medicine men and women, prevention, and folk medicine. In an interesting appendix, he treats of foods, and gives many careful anthropometric details on boys and girls, muscle tests, grayness, etc., under each rubric in more than a dozen tribes. This seems to us in many respects a model of what such studies ought to be.

Phrenology or the Doctrine of the Mental Phenomena, by J. G. SPURZHEIM. With an introduction by C. Elder. Revised edition from the second American edition of 1833. Philadelphia and London, J. B. Lippincott Co., 1908. pp. 459. Price $3.00 net.

The present volume is an exact reprint of the two-volume edition of Spurzheim's *Phrenology* published at Boston in 1833, save that the editor has omitted the author's reflections upon the moral and religious constitution of man, his volumiuous Latin notes, and a controversy with Combe. The Latin notes we might, perhaps, have spared; but it is unfortunate that the reflections and the polemic have been omitted, since they are as characteristic of Spurzheim as the phrenological doctrines themselves, and throw a good deal of light upon his attitude and methods. However, the psychologist can only be grateful for the reprint of a work which probably none but a few enthusiasts possess in any original form.

The editor contributes an introduction, in which he affirms that the spirit of the age is materialistic; that it has no science of mind and desires none; and that psychology is in no better case than it was sixty years ago. He himself, however, is still in the bonds of the psychology of faculties; and whatever the sins of current psychology, it has at least got some distance beyond Christian Wolff.

The volume is well printed and illustrated, and is pleasantly light in the hand.

Kaiser Julians philosophische Werke. Uebersetzt und erklärt, von R. ASMUS. Leipzig, Dürr'sche Buchhandlung. 1908. pp. ix, 223. Price Mk. 3.75.

This little book, forming vol. 116 of the useful Philosophical Library, contains, besides a critical introduction, German translations of six of the Emperor Julian's Orations: that on the worship of the sun, addressed to Sallustius, his old military councillor and friend, first in Gaul and afterwards in Germany; that on the mother of the gods, Cybele, whose temple at Pessinus the author visited and whose worship he restored; the two on true and false Cynicism; the one of which is addressed to the Cynic Heracleius, of whom nothing further is known; the 'letter' to the aforesaid Sallustius, in which Julian consoles himself and his friends on the recall of Sallustius, by the emperor Constantius, from Gaul to the east; and lastly the letter, or more correctly the dissertation, addressed to his former tutor, the philosopher Themistius, on the difficulty the author thinks he would experience in showing himself so perfect an emperor as Themistius expected. Each oration is preceded by a brief appreciation and analysis, and followed by a few pages of explanatory notes.

The editor and translator has performed his task with great skill and with commendable self-restraint.

The Metaphysics of Nature, by CARVETH READ. 2d ed. Adam and Charles Black, London, 1908. 372 p.

Here is a metaphysician who declares that certain shortcomings in his composition were due to the fact that he wrote "in constant dread of wearying the reader with verbiage and commonplaces." This second edition contains additions on the following subjects: truth, consciousness, transcendental being, and moral freedom. In the introduction, he treats of belief and knowledge, reality and truth. The first canonic book deals with tests of truth, historic and analytic, scepticism, and the relativity of knowledge. Book II, Cosmology, deals with substance in experience, ontology of the world, universal forms of the phenomenon. The third book is on psychology and treats of the subject in experience, and ontology and natural history. The last book is devoted to the categories, which are, first, abstract or those of relation in general, and qualitative and quantitative relations; and, second, physical, such as atoms, ether, rest, change identity, motion, force, inertia, mass, elasticity, incompressibility, mechanics, etc., and, lastly, the categories of subjective activity, parallelism, interaction, will, final causes, human ends, man and society.

The Philospher's Martyrdom, by PAUL CARUS. Open Court Publishing Co., Chicago, 1908. 67 p.

This is an interesting and stimulating book; a little more of the dramatic element put into it and it would be fit for the stage. The author's idea seems to be to bring the wise and truly philosophical agnostic of the Spencerian type in contact with a rather long series of representatives of other points of view,—priests, spiritualists, society people, etc. In the end Mr. Agnosto was shipwrecked, captured by cannibals, fattened and eaten to make them a Thanksgiving day. His memory is still kept green on Cannibal Island because he furnished them with the tenderest, daintiest Thanksgiving meal they ever enjoyed.

The Old and the New Magic, by HENRY RIDGELY EVANS. Open Court Publishing Co., Chicago, 1906. 348 p.

We have here a very interesting and copiously illustrated work which deals with the history of prestidigitation. The lives of Pinetti, Cagliostri, Houdin, and others down to Houdini, the secrets of second sight, modern thaumaturgism, magicians I have met, the riddle of the sphynx, Treweyism, are some of the chapters. The practical parlor magician is given a great many very interesting hints. The striking fact about this book is that many modern tricks of great commercial value are exposed.

The Naturalization of the Supernatural, by FRANK PODMORE. G. P. Putnam's Sons, New York, 1908. 374p.

This interesting book of a fertile author uses data largely from the unpublished journal of the Society for Physical Research. After a general introduction rehearsing the story of the foundation of the Society, the following chapters constitute the book: Experimental Thought-transference; Spontaneous Thought-transference—Mind's Eye Visions; Spontaneous Thought-transference—Coincident Dreams; On Hallucinations in General; Telepathic Hallucinations; Poltergeists; Spiritualism; On Communication with the Dead; Phantasms of the Dead; Haunted Houses; Messages Received through Trance and Automatism; The Case of Mrs. Piper; On Clairvoyance and Prevision. The marked feature of it is the progress toward an attitude of critical or suspended judgment with regard to the fundamental problem of

spiritualism and even regarding Mrs. Piper, who is coming to be perhaps more than any other individual the *pièce de resistance* of the English Society.

The Theosophist, February, 1909. Edited by Anne Besant. 189 p.

The very voluminousness of this work, founded by Mme. Blavatsky and Mr. Olcott, itself bears striking witness to the size and vigor of the circle that it represents. Theosophists now have learned to make many connections with daily life. They review current magazines, have much to say about science, the ethics of competition, separateness and unity in daily life. It is evident, too, that it fares well with theosophy in other lands. The Oriental note that runs through all is very strongly accentuated.

The Psychology of Singing, by David C. Taylor. The Macmillan Co., New York, 1908. 371 p.

A peculiar gap exists between the accepted, theoretical basis of singing and the actual methods of vocal teachers. The number of scientific treatises would lead us to infer that we have a coherent science of voice culture. This, however, is not the case. To reach a basis for this, one must have insight into the operations of the voice by listening, and then must levy tribute upon anatomy and acoustics. The author has accordingly divided his work into three parts. The first describes the methods of instruction in singing, tone production, voice culture, breathing, registers, resonance, empirical material of methods; the second, a critical analysis of them, the mechanical, vocal management being the basis, describes the fallacies of the doctrine of breath control, of forward emission, chest and nasal resonance. In the third part, the author evolves the basis of a real science of the voice, based on sympathetic sensations of vocal tone, empirical knowledge, the precepts of the old Italian school and of the modern school. And in part fourth, he applies vocal science to practical voice culture, tells us the causes of throat stiffness and of incorrect vocal action, the true meaning of vocal training, intimations of the rational method and its materials; with a final outline of the practical method of vocal culture. His book is very lucidly written and printed, and cannot fail to interest and instruct all concerned. The Appendix contains an interesting bibliography.

Friedrich Schleiermachers Weihnachtsfeier. Kritische Ausgabe, by Hermann Mulert. Dürr'sche Buchhandlung, Leipzig, 1908. (Philosophische Bibliothek, Band 117.)

Einführung in die Erkenntnistheorie, von DR. AUGUST MESSER. Dürr'sche Buchhandlung, Leipzig, 1909. 199 p. (Philosophische Bibliothek, Band 118.)

René Descartes' philosophische Werke. Dritte Abteilung, die Prinzipien der Philosophie, von DR. ARTUR BUCHENAN. Dürr'sche Buchhandlung, Leipzig, 1908. 310 p. (Philosophische Bibliothek, Band 28.)

Ueber Tierpsychologie. Zwei Vorträge, von L. EDINGER und ED. CLAPARÈDE. Johann Ambrosius Barth, Leipzig, 1909. 67 p.

Man and the Universe, by OLIVER LODGE. Methuen & Co., London, 1908. 356 p.

Psychotherapy. A course of reading in sound psychology, sound medicine and sound religion. Edited by W. B. Parker. Vol. 1, No. 2. Centre Publishing Co., N. Y., 1908. 96 p.

NOTES

The second international course for Legal Psychology and Psychiatry will be held at Giessen (Grand duchy of Hesse) Germany, April 13 to 18, 1909. The course will be under the direction of Professor Sommer with the co-operation of Professors Mittermaier and Dannemann of Giessen and Professor Aschaffenburg of Cologne. Address all communications to Dr. Sommer, Professor of Pyschiatry, University of Giessen.

Course on the Feebleminded

The Neurological Institute in Frankfurt on the Main, in connection with the *Frankfurt Special Classes* (Help-schools) will arrange a two-weeks' course on *Problems Concerning Feebleminded and Psychopathic Children*. This is to be given the latter part of June, 1909. Scientific research, clinics, psychology, education and methods, and forensic questions, will be the subjects of lectures and courses by specialists. The course is intended for those who are professionally engaged in this work, or are interested in it, or who wish to prepare themselves for it. It aims to offer a basis for extended work, a survey of the whole affair and its practical management. Accordingly, the chief emphasis will be laid on *practical presentations and demonstrations* (anatomical, pedagogical, presentation of patients and experimental demonstrations). As far as possible all sides of the subject and their bearing on other branches of knowledge will be considered.

The following courses and demonstrations are planned:

Normal and pathological anatomy of the juvenile brain. Child psychology. Psychopathology of youth. Instruction of the feebleminded. Methods of teaching. Organization. Hand-training. Institutional affairs and care for the inmates. Clinic for feebleminded children. Care and education in institutions and forensic Psychiatry. Juvenile courts. Social care. Speech therapeutics (Articulation). Hygiene. Care for the deaf and dumb, the blind, and cripples.

A series of Schools for Feebleminded, Institutions, Clinics and Scientific Institutes will be visited. The detailed programme will appear in the spring. For particulars address the committee: Privatdozent Dr. H. Vogt, Neurologisches Institut, Gartenstrasse, Frankfurt, a. M., or Rector A. Henze, Wiesenhüttenschule, Frankfurt, a. M.